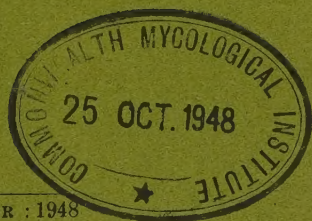




ZANZIBAR PROTECTORATE

Annual Report
OF THE
Department of Agriculture
1947

[PRICE: SHS. 2]



DEPARTMENT OF AGRICULTURE.

STAFF.

Director	...	R. O. Williams, O.B.E., A.R.H.S.,
Senior Agricultural Officer	...	O. S. Swainson, B.A. (Cantab.).
Agricultural Officers	...	J. E. Baker, CERT. AGRIC. (Seale Hayne), (retired 2nd December, 1947). A. K. Briant, M.A., DIP. AGRIC. (Cantab.), A.I.C.T.A. (Trinidad). F. B. Wilson, M.B.E., M.A., DIP. AGRIC. (Cantab.), A.I.C.T.A. (Trinidad). G. E. Tidbury, B.Sc., A.R.C.S., A.I.C.T.A. (Trinidad). D. W. Winter, B.Sc. (St. Andrews), (arrived on first appointment on 14th December, 1947).
Government Chemist	...	L. W. Raymond, B.A., B.Sc. (Lond.), A.R.C.S., A.I.C. (retired 25th February, 1947). W. E. Calton, B.A., A.R.I.C., DIP. AGRIC.
Manager of Plantations	...	I. G. C. Squire.
Inspector of Produce	...	A. C. E. Callan.
Veterinary Officer	...	Fazal Din Ahmedi, G.P.V.C.

Mr. O. S. Swainson, Senior Agricultural Officer, has since been appointed Director of Agriculture, and Mr. A. K. Briant, Agricultural Officer, Senior Agricultural Officer with effect from 22nd December, 1947.

PREFACE.

A Summary of the Agricultural Policy of Government.

I. LAND.

1. The mortgaging and alienation of agricultural land owned by Africans and Arabs is controlled and restricted by Boards instituted for this purpose under the Land Alienation Decree.

II. FOOD AND NUTRITION.

The active encouragement of the increased production of food crops and stock assisted by:—

FOOD CROPS.

1. The introduction and selection of higher yielding strains of existing crops.

2. The introduction, trial, and acclimatisation of new food crops, with especial reference to those of improved nutritive value.

3. The issue of seeds and planting materials from demonstration stations and other plots throughout the Protectorate.

4. The reclamation, drainage, and irrigation of swamp areas in order to facilitate the production of rice and other food crops.

5. The demonstration of the possibility of growing vegetables, experimentation as to types of vegetables which flourish locally, and the general encouragement of the industry.

LIVESTOCK.

1. The use of quarantine methods for all imported cattle, sheep, and goats to prevent the introduction of diseases from which the Protectorate has hitherto been free and to limit the possibility of the re-introduction of diseases which have occurred from time to time in epidemic form.

2. The control of East Coast Fever by a system of dips throughout both islands.

3. The eradication or control of the tsetse fly in Zanzibar Island, and the prevention of its introduction into Pemba Island.

4. The breeding of improved quality cattle, sheep and goats for sale to local farmers and dairymen.

5. The castration of inferior males.

6. The prevention of slaughter for food of useful female breeding stock.

7. The distribution of setting eggs and good strains of superior breeds of poultry.

III. FORESTRY.

1. The conservation of existing forest with especial regard to control of possible erosion.

2. The afforestation of certain areas with especial regard to the possibility of afforestation of certain areas of the karst country.

3. The conservation and controlled cutting of mangrove forests.

IV. EXPORT CROPS.

1. The departure from a two-crop economy (cloves and copra) by the propagation, testing, and encouragement of the growing of cacao as a third permanent export crop.

2. The encouragement of possible exportable crops, such as derris, chillies, tobacco, pawpaws for papain and fruit.

V. MARKETING.

1. The Clove Growers Association guarantee a fixed minimum price to growers for their clove crops. This price is adjusted yearly in conformity with market conditions. It provides facilities by which growers can obtain cash advances against their crops for a limited period.

2. The Association, acting on behalf of the Ministry of Food, also arranges all exports of copra and coconut oil on a price basis effective until 31st December, 1950.

3. All exports of tobacco are arranged through the Association, and a guaranteed price is offered for chillies.

VI. PRODUCE QUALITY STANDARDS.

1. Pre-sale examination of cloves, clove stems, copra, and mangrove bark, under an Adulteration of Produce Decree.
2. Examination before export of cloves, mangrove bark and chillies, accompanied by grading according to determined standards.
3. Either pre-sale examination or grading prior to export of any other crops in respect of which such action is considered to be necessary.
4. Assistance in the construction and improvement of copra kilns.

VII. CREDIT.

Loans, secured on the crops themselves, for the cultivation and general improvement of plantations and advances against crops for picking expenses, are provided through the medium of the Clove Growers Association, an organisation under the ægis of Government.

VIII. AGRICULTURAL EDUCATION.

1. The training at Makerere of suitable candidates for higher posts in the subordinate technical staff.
2. The further training of those holding higher posts in the subordinate staff to fit them to fill senior staff posts.
3. The training at Kizimbani of all potential field assistants.
4. The provision of training courses for sons of farmers and others wishing to become progressive farmers.
5. The inculcation of a liking for farming and gardening, by the provision of school gardens, by all undergoing primary and secondary education.

SECTION I.

AGRICULTURE IN THE PROTECTORATE.

General.

1. Though the supply of imported foodstuffs was on the whole maintained there was no alleviation in the world food situation in general, and local production and the campaign for as great a measure of self-sufficiency as possible continued to be a matter of the greatest concern both to the Department of Agriculture and to the Administration.

Favourable long rains ensured satisfactory yields of all main seasonal root crops, and this was reflected in a general decline in the price level of all local agricultural produce and an absence of the near famine conditions which were too frequently a feature of the previous year.

2. The expansion of cocoa planting proceeds steadily, and the Government Chemist has commenced a series of investigations which may result in the selection of land suitable for this crop being put on a much sounder and more certain basis than is at present the case.

3. Among export crops papain, derris, and chillies continued to receive special attention. Early in the year the Senior Agricultural Officer visited the Arusha district of Tanganyika in order to study papain growing, and as a result plantings of the Hawaiian variety of pawpaw have been extended, and a drying kiln constructed at Kizimbani. The industry is not, however, likely to be suitable for the small man with a few trees.

4. Thirty-nine cultivators, mostly village headmen, planted plots of derris and it is intended to continue to encourage this crop, which offers a good return and, once established, is very little influenced by variable weather conditions.

5. Every encouragement has been given to the growing of chillies for export, but as yet without appreciable success, though the outlook in Pemba is promising. The crop is an unpopular one owing to the labour of picking the very small fruit and its irritant nature. The former is being gradually overcome by selection but the latter is inherent.

6. Favourable prices have resulted in substantial exports of kapok, both floss and seed, and there has also been continued interest in coir rope. A departmental baling press has materially assisted in packing for export.

7. Other potential export crops which have received attention are cashew and candlenut (*Aleurites moluccana*). At present the price offered for the former is insufficient to ensure harvesting, and the technical difficulties involved in economic extraction of the oil from the latter are still unsolved.

Agricultural Development Programme.

8. Despite the staff situation considerable progress had been made by the end of the year.

The land for the two sub-experimental stations has been acquired, and both in Zanzibar and Pemba a satisfactory amount of the necessary capital construction work has been completed. Cropping too has been commenced,

especially with permanent crops such as cacao, pawpaw, banana and cashew. At the Zanzibar station the absolutely essential walling against pigs is nearly completed, and plans are well advanced for getting livestock on to the land and starting controlled grazing experiments.

9. Work in connection with the eight demonstration plots is less advanced, but in every instance a site has been selected and in four cases such acquisition as has been necessary is completed. These four plots will all be under cultivation during the forthcoming rains.

Land tenure and usage problems have created great difficulties and considerably delayed progress with the vegetable growing scheme, which it is hoped to expand to a full scale irrigation project covering some 400 acres. All other preliminary work has been completed but only limited progress can be achieved while basic difficulties remain unsolved.

10. Propaganda respecting the planting of cacao, chillies, and derris continues. 9,129 cacao seedlings were distributed to private plantation owners during the year, 44 cultivators laid down plots to derris, and, up to the end of the year over half a million chillie seedlings had been raised and 285,998 distributed.

11. The erection of the various processing units is being delayed by the non-arrival of machinery, but one fairly large rice mill at Kinuni Mdo will be in action before the 1948 crop is harvested.

12. Despite the shortage and high price of materials 53 new kilns had been constructed and 27 repaired up to the end of the year. It should be realised that, except for advice and a very small amount of skilled assistance, the entire cost of this work has fallen on the kiln owners.

13. Largely as the result of a visit from Dr. Worthington it has been decided to modify the original dipping scheme by concentrating on three areas in the first place; a country and town area in Zanzibar and a country area in Pemba. The need for some initial modification has been emphasised by the fact that in Pemba especially, cattle owners cannot reasonably be expected to take their cattle more than 2½ to 3 miles to the nearest dip.

14. At Kizimbani Stock Farm calf mortality, which was a serious factor in the early years, seems finally to have been got under control, and, despite a serious shortage of suitable foodstuffs, milk records for the year have not been unsatisfactory. Policy has now crystallised to methodical bull testing, the results of which it will not of course be possible to assess for three or four years.

15. Work on the restoration of degenerate pastures has been started at Kizimbani and some very interesting results achieved. This work will be continued and extended to the coconut grazing areas in the vicinity of the town.

16. As regards agricultural training a new departure during the year was the initiation of practical and theoretical instruction in crop and animal husbandry for Rural Middle School boys. This was a marked success and much interest and keenness was displayed by the pupils. All arrangements for the "Young Farmers Course" had been completed by the end of the year.

17. Despite the fact that it was not possible to obtain the services of a Forestry Officer preliminary work on the control of erosion on the Masingini ridge has been started. Gully erosion has here been taking place for some years, and has resulted in the formation of several large basins, two of which are approximately half an acre in extent. In 1947 work was commenced to measure the speed at which gully formation is proceeding, and to ascertain the best control measures to adopt. In the first place strong earth barriers supported by plaited bushwood, and tree trunks have been erected, and the barriers have been protected by the planting of *Paspalum notatum* on their slopes.

18. A fair number of forest trees have been raised in the Migombani gardens, which are to be partially used as forest nurseries.

19. A serious factor in the progress of development is the fact that young men are reluctant to adopt agriculture as a career and only two agricultural pupils from the Protectorate are in training at Makerere, though the programme makes provision for eight. In addition the course itself occupies five years.

20. Dr. D. W. Duthie, acting Director of the East African Agricultural Research Institute at Amani, visited Zanzibar in January to consult with Dr. Nutman as to the Clove Research Programme and to undertake a brief reconnaissance of the Zanzibar soil types and their apparent relation to "Sudden Death".

Dr. Keen, who has since accepted the post of Director of the new East African Agricultural Research Institute, accompanied by Dr. Worthington, Scientific Secretary to the Governor's Conference, visited Zanzibar in June. Dr. Worthington paid a longer visit to both islands in August.

The advice of these scientists and the interest in agricultural problems shown by them and other visitors has always been most welcome.

Clove Research Scheme.

21. During the year Dr. Nutman's programme of scientific and agromomic research received the approval of the Colonial Agricultural Research Council and Dr. Nutman himself arrived in the Protectorate on the 21st November, followed by Dr. Sheffield, a Plant Anatomist, seconded from the Rothamsted Agricultural Institute. Other members of the research staff arrived later and the appointment of a Horticulturist is expected shortly.

22. The organisation is based on Livingstone House, a memory of the explorers Stanley and Livingstone, which has now been equipped with laboratories and facilities for research.

23. At the request of the Director of Clove Research several thousand seedlings of species of *Eugenia* and *Psidium* were established at Kizimbani in pots or nurseries for the use of the research team.

Weather.

24. The rainfall during the year was about normal in Zanzibar and above normal in Pemba, as compared with a 1946 precipitation which varied from 15 to 20 per cent below normal in both islands. Despite this, distribution was not particularly favourable, as both islands experienced an

abnormally dry period in June and July, and in Pemba this condition was repeated in September and October. In neither island were the short (*vuli*) rains really good, and in many places on the eastern seaboard they were almost a complete failure.

25. These rather curious circumstances are illustrated by the following figures from Wete in Pemba, which are reasonably typical of 1947, especially in that island, and do illustrate how misleading figures for total precipitation can be:—

	Period	1947	Average for past 27 years
Pre-Masika	January/February	... 1.39"	... 4.47"
Masika	March/May	... 66.02"	... 42.41"
Mchoo	June/August	... 8.13"	... 10.41"
Pre-Vuli	September/October	... 1.85"	... 5.31"
Vuli	November/December	... 10.97"	... 14.73"
Total		... 88.36"	... 77.33"

A more striking example is Limbani, only two miles from Wete, which had 93.33 inches in March, April, and May out of a total of 117.95 inches for the whole year.

Principal Crops.

26. *Cloves*.—The clove crop for the seasonal year July, 1946, to June, 1947, was 38,311,322 lb. equivalent to 1,094,609 frasilas of 35 lb. each. Only in 1937/38 and 1941/42 has this production been exceeded. It is significant, however, that 88.12 per cent of this crop came from Pemba. Most of this total came from a *vuli* crop, mainly harvested from November, 1946 to January, 1947. Annual production figures and graphs showing production over 10-year periods are given in Appendix III.

27. There was practically no *mwaka* (early) crop during 1947, and only a very small *vuli* (late), most of which was harvested by the end of the year. Cloves passing through the market from 1st July to 31st December totalled 5,246,814 lb. or 149,909 frasilas.

28. As the result of the small crop there were no real picking difficulties, though irregular ripening in Pemba made it difficult to keep the labour constantly employed.

29. Exports fell from 34,748,896 lb. to only 16,830,769 lb., which is 5,466,236 lb. less than the average for the preceeding 20 years.

In view of restricted imports into India, the unsettled condition of Java, and the purchase by the United States of low grade cloves from Madagascar, this cannot be regarded as too unsatisfactory. It must be remembered that the large exports in 1946 were to a considerable extent due to the building up of depleted stocks, a circumstance which cannot be expected to repeat itself year after year.

30. Practically no cloves were purchased by the Clove Growers Association until towards the end of the year, and as a result the minimum percentage to be purchased by shippers under the Clove Export Decree was reduced from 10 per cent to nil with effect from 1st April.

31. The buying price of the Clove Growers Association per 100 lb., remained unchanged at the following rates until the 20th December, on which date it was increased by Shs. 2 for all grades except sweepings:—

Good quality	Fair quality	Poor quality	Inferior quality	Sweepings and cloves fit for distillation only
Shs. cts.	Shs. cts.	Shs. cts.	Shs. cts.	Shs. cts.
47 50	45 00	42 00	37 00	28 00

Pemba buying prices were in every case Shs. 1/38 lower.

The buying price for stems remained unchanged at Shs. 13/50 for commercial quality and Shs. 12/50 for inferior quality.

The Association's selling prices remained unchanged throughout the year at a nominal Shs. 55 for good quality, Shs. 52 for fair quality and Shs. 49 for poor quality.

32. During the first three months of the year all cloves offering were absorbed at prices up to Shs. 52/08 per 100 lb., but when it became clear that neither India nor Java were likely to be substantial buyers the market weakened and towards the end of the year prices were little more than Shs. 45. Nevertheless no stockists sold cloves to the Association. In early December, on the probability of an increase in the Association's buying price, prices rose to over Shs. 46.

33. The principal export market was still India, taking 11,229,881 lb., representing 66.72 per cent of the total exports, followed by Singapore taking 11.87 per cent and Continental Europe, America, and the United Kingdom taking 5.45, 4.39 and 3.34 per cent respectively. Other countries took 8.23 per cent.

A pleasing feature is the revival of shipments of small parcels to destinations which have been out of the market since before the war.

34. Exports of clove oil were only 385,905 lb., about an average figure, though below the 410,677 lb. for 1946, and the record figure of 525,313 lb. for the previous year. The decrease was largely due to the fact that no buds were available for distillation after March.

Exports were again mainly to the United Kingdom.

35. In Pemba picking costs rose to 35 or even 40 cents a pishi in January and February, but local labour managed to pick approximately 75 per cent of the crop.

36. The situation regarding Sudden Death remains much the same as in 1946. In some areas drought deaths still continued, but on a very much reduced scale.

37. *Coconuts*.—Disposal of the exportable surplus of copra and coconut oil remained in the hands of the Ministry of Food, all available copra being consigned to Kenya and coconut oil to Aden, Palestine and Cyprus.

38. Prices remained unchanged throughout the year, though negotiations for an increase were commenced early in September. Up to the end of the year no finality had been reached and prices thus remained unchanged at £30 10s. per ton for F.M.S. copra, £30 for F.M. and £50 4s. for coconut oil.

39. Exports for the year were as follows:—

				<i>Copra equivalent</i>	
Copra	...	7,823 tons	...	7,823	tons
Coconut oil	...	1,069 „	...	1,781	„
Soap	...	494 „	...	824	„
				10,428 tons	

Taking into consideration that there was a carry over of some 2,000 tons of copra from 1946, and no large compensating carry over into 1948, this is a disappointing total, being approximately 183 tons less than the corresponding figure for 1946. Yields were undoubtedly affected by the 1946 drought.

40. Towards the end of the year the local oil millers, assisted by the introduction of new machinery and the arrival of spares for worn-out plant, absorbed all the copra offered, and there were no exports after September.

41. Local copra prices during the year varied as follows, the two figures given in each case being the highest and lowest at which transactions were completed. In every case they are for 100 lb.:—

										B.S.D.	
										(Government	
Quarter ending										Plantation only)	

Note :—F.M. Fair merchantable.
F.M.S. Fair merchantable sun-dried.
B.S.D. Best sun-dried.

The sharp rise in prices in the last two quarters of the year was partly due to competition among millers and partly to anticipation that the negotiations with the Ministry of Food might lead to a rise in price.

42. The average price per 100 lb. realised for copra from Government Plantations was Shs. 24.06.

43. *Mangrove Bark*.—As had been anticipated mangrove bark exports decreased and fell from 11,698 to 4,825 tons, shipments being almost entirely to the United States of America.

44. Prices ranged from Shs. 150 to Shs. 160 per ton f.o.b. for all bark during the first two quarters of the year with a small increase for best fibrous bark in the third quarter. Towards the end of the year the difference between the prices offered for fibrous and non-fibrous bark became most marked, fibrous fetching from Shs. 140 to Shs. 160 as compared with Shs. 90 to Shs. 100 only for non-fibrous.

45. Further legislation to prohibit cutting whenever considered necessary, and to zone it in other areas, was enacted during the year, and minimum thickness standards are to be included in the export regulations.

46. By the end of the year there was no more non-fibrous bark (*Rhizophora mucronata*) thick enough to ensure a minimum tannin content—the United States require 38 per cent—and until further notice cutting will be confined to fibrous bark (*Bruguiera gymnorhiza*). This will of course give the non-fibrous trees an opportunity for unhindered regeneration and growth.

47. It is hoped in due course to reduce yearly cutting to a tonnage equal to the annual increment of the trees, thus stabilising the trade and preventing violent fluctuations one way or the other.

Food Crop Production.

48. The year 1947 was very definitely a better year than 1946 for obtaining imported foodstuffs, except for rice, but many essentials, including the staples of maize meal, wheat flour, and sugar, were still subject to a programme, and even non-programmed foodstuffs were frequently far from being in free supply.

49. As in previous years local food production was stimulated by a series of planting orders, published at the appropriate time for each island and dealing with main crop rice, and pulses and sweet potatoes on the rice stubbles. A cassava planting order was published in Pemba, but in Zanzibar activity in this direction was so apparent and widespread that an order was not considered necessary.

50. Comparative figures for rice production in both islands are as follows:—

<i>Estimated Production of Paddy in Tons.</i>				
	<i>Zanzibar</i>	<i>Pemba</i>	<i>Total</i>	
1945	... 8,368	... 10,000	...	18,368
1946	... 3,618	... 5,000	...	8,618
1947	... 5,700	... 4,585	...	10,285

Production in both Zanzibar and Pemba would have been far higher had it not been for a serious seed shortage, arising from the shortage of food during 1946. Nevertheless, in country districts, the amount harvested was a most useful adjunct to the family larder.

51. The only real crop failures were those of late *vuli*-planted grain in the north-eastern portions of both islands. In fact in some places it was not possible to plant at all. But the generally improved food situation provided a reserve from other areas and made local shortages far less marked than during the previous year.

52. The following planting material directly connected with increased food production was either distributed free or sold:—

		<i>Zanzibar Stations, including Kizimbani</i>		<i>Pemba Stations</i>	<i>Total</i>
Cassava cuttings	... Nos.	207,500	...	80,000	... 287,500
Sweet potato slips	... "	202,800	...	70,000	... 272,800
Rice seed	... lb.	62,026	...	7,750	... 69,776
Bulrush millet seed	... "	—	...	425	... 425
Mtama seed	... "	—	...	285	... 285
Dwarf mtama seed	... "	180	...	—	... 180
Pulses	... "	481	...	32	... 513
Maize seed	... "	1,964	...	—	... 1,964
Groundnut	... "	58	...	—	... 58
Bambarra Groundnut	... "	20	...	—	... 20
Tannia suckers	... Nos.	7,650	...	2,000	... 9,650
Banana suckers	... "	717	...	—	... 717
Rice seedlings	... "	—	...	1,000,000	... 1,000,000

53. Comparative sales of foodstuffs in the Estella market were as follows:—

		<i>Fish.</i>		<i>Fruit.</i>		<i>Vegetables.</i>		<i>Staple Starchy</i>
		<i>lb.</i>		<i>Pakachas</i>		<i>Pakachas</i>		<i>Foods.</i>
								<i>Pakachas</i>
1945	...	208,162	...	39,021	...	48,654	...	77,675
1946	...	183,160	...	65,479	...	43,581	...	72,218
1947	...	194,245	...	29,140	...	43,434	...	67,795

Domestic Exports of Agriculture, Forest and Marine Origin.

54. The table below gives particulars of the exports of all natural non-mineral products.

<i>Item</i>	<i>Unit</i>	<i>Quantity</i>	<i>Value</i>	<i>Per cent of total value</i>
Cloves	cwts.	150,688	555,106	51.84
Clove bud and stem oil ...	lb.	385,905	72,361	6.76
Copra	tons	7,823	234,675	21.92
Coconuts	Nos.	1,061	6	—
Oil cake	cwts.	37,893	39,174	3.66
Coconut oil	lb.	2,394,675	53,667	5.01
Soap, common and toilet ...	cwts.	9,887	27,687	2.59
Mangrove bark	tons	4,823	50,662	4.73
Chillies	cwts.	100	597	0.05
Fruit, fresh	—	—	4,223	0.39
Beche de mer	cwts.	2,142	5,737	0.54
Tobacco, unmanufactured ...	lb.	55,165	1,379	0.13
Ox hides	cwts.	940	3,358	0.31
Skins, sheep and goats ...	Nos.	20,627	2,254	0.21
Livestock	„	721	125	0.01
Forest products	—	—	2,112	0.20
Fibres, manufactured	cwts.	2,157	4,630	0.43
Shells, marine	„	2,969	6,177	0.58
Rope, cordage, and twine ...	„	2,155	4,729	0.44
Other unclassified natural products	—	—	2,147	0.20
			<u>£1,070,806</u>	<u>100.00</u>

55. The following comparisons of export values will be of interest.—

	<i>Percentage of Total Exports.</i>		
	<i>1945</i>	<i>1946</i>	<i>1947</i>
Cloves and clove bud and stem oil ...	68.57	73.15	58.60
Coconut products ...	24.98	16.81	33.18
Mangrove bark ...	5.02	8.14	4.73
Other	1.43	1.90	3.49

The increase in the price of copra and coconut oil, and the high export price for copra cake, have raised the value of coconut products to nearly a third of the total.

SECTION II.

WORK OF THE DEPARTMENT OF AGRICULTURE.

General.

56. *Staff*.—Mr. R. O. Williams, O.B.E., relinquished the post of Acting Secretary-Manager, Clove Growers Association, on the 25th February, 1947, and again took up the same duties as from the 17th June, 1947, until the 22nd June, 1947, on which date he proceeded on privilege leave.

Mr. O. S. Swainson, Senior Agricultural Officer, acted as Director of Agriculture during the time that Mr. Williams was seconded to the Clove Growers Association and subsequently until the end of the year. Mr. A. K. Briant, Agricultural Officer, acted as Senior Agricultural Officer from 22nd June to the end of the year. Mr. J. E. Baker, Agricultural Officer, proceeded on leave prior to retirement on 28th March, 1947. Mr. A. C. E. Calian, Inspector of Produce, proceeded on leave on 23rd May, being relieved by Mr. G. J. Natha, Senior Examiner, Special Post. Mr. G. E. Tidbury, Agricultural Officer, returned from leave on the 26th June. Mr. F. B. Wilson, M.B.E., was District Agricultural Officer, Pemba, throughout the year. Mr. W. E. Calton, Government Chemist, arrived on transfer from Tanganyika Territory on 4th May, 1947. Both the Director and Acting Director fulfilled the functions of Food Controller and were members of Legislative Council and of His Highness' Executive Council during the time that they were in office.

School Gardens.

57. Little real progress can be recorded except that five teachers are to be taken into the "Young Farmers Course" which will be run for its first year in 1948.

This will constitute an initial implementation of the action which, in my predecessor's report for 1946, was indicated as being the only real solution of this difficult problem.

58. *Migombani Gardens*.—The first full year's working since these gardens were taken over by the Department in November, 1946, has now been completed. The general condition and appearance of the gardens have much improved, and during the year some 8,000 seedlings and cuttings of forest and ornamental trees, trees bearing edible fruits, and shrubs and hedge plants have been raised.

Some hundred seedlings were distributed during the year and seed collection for outside requirements was undertaken.

59. *Compost Manufacture*.—Sales during the year were 654 tons and free issues 69, a total of 723 tons, as compared with corresponding figures of 469, 145 and 614 tons for 1946. The big reduction in free issues was due to the virtual closing of the Marhubi gardens.

The experiment of selling compost by the *debe*, or 4-gallon petrol tin, was tried during the year, but did not prove very popular.

Distribution of Plants and Seeds.

60. It has been found that normal private enterprise in Zanzibar is not yet capable of providing sufficient vegetable seed for small private demands, and the Department has had to continue to import seeds for re-sale.

Apart from vegetables, planting material for food crops, and the already mentioned small distribution from Migombani, the following planting material was distributed during the year.

				<i>Kizimbani</i>	<i>Pemba</i>	<i>Total</i>
Budded orange	...	...	Nos.	1,707	349	2,056
Budded grapefruit	...	...	"	288	—	288
Budded mandarin	...	...	"	8	—	8
Grafted mango	...	...	"	31	—	31
Coffee (<i>liberica</i>) seedlings	...	...	"	354	653	1,007
Mango seedlings	...	...	"	231	25	256
Chinese guava seedlings	...	...	"	12	—	12
Rambutan seedlings	...	...	"	216	70	286
Sweet lemon seedlings	...	...	"	—	2	2
Avocado pear seedlings	...	...	"	27	18	45
Durian seedlings	...	...	"	85	—	85
Sapodilla seedlings	...	...	"	18	10	28
Soursop seedlings	...	...	"	—	58	58
Nutmeg seedlings	...	...	"	72	14	86
<i>Eugenia uniflora</i> seedlings	...	...	"	22	—	22
<i>Eugenia aquea</i> seedlings	...	...	"	—	74	74
<i>Eugenia javanica</i> seedlings	...	...	"	11	—	11
<i>Eugenia jambosa</i> seedlings	...	...	"	—	32	32
Marcotted litchi	...	...	"	69	26	95
Pomegranate seedlings	...	...	"	—	16	16
Lime seedlings	...	...	"	93	42	135
Pawpaw seed	...	...	lb.	20	—	20
Kudzu (<i>Pueraria phaseoloides</i>) seed	...	...	"	21	—	21
<i>Calapogonium</i> seed	...	...	"	30	—	30
<i>Centrosema</i> seed	...	...	"	32	—	32
<i>Crotalaria</i> seed	...	...	"	36	—	36
Chillie seedlings	...	...	Nos.	—	281,981	281,981
Chillie seed	...	...	lb.	22	—	22
Pineapple suckers	...	...	Nos.	2,175	—	2,175
Derris: rooted cuttings	...	...	"	33,460	—	33,460
Grapefruit seedlings	...	...	"	—	49	49

Clove Regeneration.

61. The distribution and the financial responsibility for the supply of clove seedlings remained unchanged, and the following seedlings were distributed during the year.

	<i>Zanzibar</i>	<i>Pemba</i>	<i>Total</i>
Sold	66,970	37,433	104,403
Issued free	97,230	21,845	119,075
Not taken up	14,000	22,495	36,495
	<u>178,200</u>	<u>81,773</u>	<u>259,973</u>

Both the greater total distribution in Zanzibar and the far greater number of free seedlings issued illustrate the different situation in the two islands as regards deaths from "Sudden Death" and drought.

62. The programme for 1948 distribution, exactly the same as for 1947, is as follows:—

	Zanzibar	Pemba	Total
Protectorate Funds	70,000	60,000	130,000
Colonial Development and Welfare subsidised free distribution ...	70,000	30,000	100,000
Clove Growers Association subsidised free distribution ...	30,000	20,000	50,000
	<u>170,000</u>	<u>110,000</u>	<u>280,000</u>

The 1949 programme is being reduced to a total of 150,000 seedlings in Zanzibar and approximately 90,000 in Pemba.

63. There are approximately 167,000 seedlings in Zanzibar and 94,000 in Pemba ready for the 1948 *masika* planting.

64. A baling press belonging to the Department and formerly used for the baling of clove leaves was re-conditioned and made available for hire by the public. It was in use for 35 days and was instrumental in baling considerable quantities of coir fibre and kapok floss.

65. As from the beginning of 1947 the Agricultural Advisory Committees in Zanzibar and Pemba commenced to hold regular monthly meetings, these being occasionally varied by visits to agricultural activities of general interest. These Committees, especially that in Pemba, are now feeling their feet and proffering useful advice.

66. During the year a Board was appointed, under the provisions of the Copra Cess Decree, to administer the funds made available by the collection of the Cess. The Director of Agriculture is at present Chairman of this Board.

Government Plantations.

67. From the summarised statement (Appendix I) at the end of the report it will be seen that there was a loss of Shs. 16,690 on the year's working, as opposed to Shs. 8,720 in 1946. Taking into consideration that this includes the full emoluments of the manager and the headquarters staff, and also allowing for the fact that all capital expenditure on the planting and regeneration of coconuts and cloves and on the planting of cocoa is included under recurrent expenditure, this is not too unsatisfactory.

68. Appendix II analyses the actual plantation expenditure and revenue of the four main units.

As usual Kidichi shows a handsome profit, but Selem was affected by the heavy cost of regeneration and planting, and Chukwani and Mtoni by the poor coconut crops. It must be remembered that nothing is paid by the Mtoni dairymen for the grazing in that unit, which is their main pasture.

69. The number of coconuts harvested during the year was 20 per cent below average and 23 per cent below the figure for 1946. In addition the size has been small, the quality poor and there were an unusually large number of rotten nuts. Comparative figures are as follows:—

	1944	1945	1946	1947
Nuts gathered and brought in by patrols	2,413,012	2,263,571	2,679,630	2,067,931

It is reasonable to assume that the poor production was mostly due to the severe drought in the previous year.

The smallness in size is illustrated by the fact that it took on the average 6,810 nuts to make one ton of copra as compared with an average of 6,621 nuts for the previous three years.

70. During the year 2,261,366 nuts in all were dealt with as follows:—

	<i>Nuts</i>			<i>Nuts</i>	
Brought forward	...	193,435	Made into copra	...	1,835,602
Gathered	...	2,051,059	Sold as nuts	...	266,468
Collected by patrols	...	16,872	Used for seed	...	39,090
			Destroyed by fire	...	4,340
			Rotten and unusable	...	39,253
			Carried forward	...	76,613
		<u>2,261,366</u>			<u>2,261,366</u>

71. The average price realised per 1,000 nuts during the past five years is as follows:—

<i>1943</i>	<i>1944</i>	<i>1945</i>	<i>1946</i>	<i>1947</i>
Shs. 34/95	Shs. 40/85	Shs. 45/62	Shs. 55/37	Shs. 62/52

Copra made during the same period and average prices realised are given below:—

	<i>1943</i>	<i>1944</i>	<i>1945</i>	<i>1946</i>	<i>1947</i>
Tons of copra	...	342	306	343	287
Average price per ton	...	Shs. 287/50	Shs. 317/-	Shs. 349/50	Shs. 460/-
					Shs. 539/-

The two tables above well illustrate the steadily rising prices of coconuts and copra.

72. As from the 27th March, rates of pay to huskers and breakers were increased from Shs 1/75 to Shs. 2 and from Shs. 3/25 to Shs. 3/75 respectively.

73. 500 seedlings were used for supplying and 7,040 sold to the public at 12 cents each. Coconut nurseries for 1948 were established as follows.—

Mdo	...	20,000 nuts.
Selem	...	11,000 „
Mtoni	...	8,090 „

Small coconut nurseries to test demand were established at all existing clove nurseries in Pemba.

74. Cloves and Stems harvested during the past three seasons have been as follows:—

	<i>Green cloves</i>	<i>Dry cloves</i>	<i>Dry stems</i>	<i>Average price per 100 lb.</i>	
	<i>lb.</i>	<i>lb.</i>	<i>lb.</i>		<i>Dry cloves</i>
1945/46	...	3,747	1,185	342	...
1946/47	...	273,692	87,032	24,368	...
1947/48	...	11,202	3,691	1,048	...
					Shs. 51/25
					„ 52/28
					„ 47/04

The above figures include cloves from the Kizimbani Experimental Station which are handed to the Plantation Section for drying and marketing.

75. During the rains 5,923 clove seedlings were transplanted to the field as follows:—

Old clove areas	...	...	2,273
Regeneration areas	...	...	1,600
Interplanted with cacao	...	...	1,050

It is worthy of note that at Selem only 1,500 mature trees are left out of a stand of 12,000 trees twelve years ago.

76. The cacao planted at Selem in the first half of 1946 has thriven in spite of a slight attack of *Heliothrips rubrocineta* in April which was quickly brought under control. The area planted at Langoni during the second half of 1946 has not done so well but is holding its own.

77. The first planted area at Selem has been extended by the planting of a further $12\frac{1}{2}$ acres containing 2,633 sites. A further planting of $7\frac{1}{2}$ acres containing 1,800 sites was made at the Mfenesini end of the Selem plantation in an area already regenerated with young cloves but with dead "Sudden Death" trees still standing.

The Langoni area was extended by a further ten acres containing 4,063 sites.

78. Plantings can be summarised as follows:—

		1946	1947	Total
Selem (Sakafu)	...	2,702	2,633	5,335
Selem (Mfenesini)	...	—	1,800	1,800
Langoni	...	756	4,063	4,819
		3,458	8,496	11,954

The 1947 work on cocoa planting and maintenance was responsible for over £500 of the Plantation section expenditure.

79. Some $2\frac{1}{4}$ acres were planted with Derris and some experimental plantings of Candlenut (*Aleurites moluccana*) made.

Kizimbani Experiment Station.

80. The building section of the station was again active throughout the year. The policy of erecting buildings of a semi-permanent nature, protected from termite infestation by an ant-proof course, was again followed. The repairing and upkeep of old buildings not protected in this way were never-ending tasks.

Buildings constructed with Protectorate funds include the following:—

- An office for the District Agricultural Officer and his staff. This completed the arrangements necessary for the transfer of District work headquarters from Zanzibar town to Kizimbani.
- An outside kitchen for the Agricultural Officer's quarters.
- A seed-testing room to ensure that no seed shall be distributed from the station unless it is of satisfactory viability.
- A small drying floor for vegetable and other seeds.

- (e) In addition the office accommodation for the Assistant Agricultural Officer and junior members of the staff was extended and improved by the virtual re-building of an existing termite infested office.

81. Buildings constructed with funds derived from Colonial Development and Welfare Schemes include the following:—

- (a) Quarters for twelve students who will attend the Young Farmers Course, together with a refectory and schoolroom.
- (b) A teacher's house.
- (c) A milker's quarters at the stock farm.
- (d) A papain drying kiln.
- (e) The foundations of a building to house crop processing machinery and a power plant. This building will be completed in 1948.

82. Building costs rose still higher during the year but a great economy was effected by using the station truck for transporting materials. An analysis of the costs of building houses in 1948 showed that expenditure was roughly distributed as follows:—

Cement	...	...	11 per cent
Local materials	...	...	32 „ „
Doors and windows	...	...	13 „ „
Transport	...	...	1 „ „
Wages	...	...	43 „ „

These figures show that the cost of wages is disproportionately high, but the demand for masons and builders is now such that it is impossible to get work done more cheaply.

83. *Cloves*.—There were no important developments in clove investigations during the year though two features concerning the experiments are worthy of comment.

84. The first is the substitution of sodaphosphate for superphosphate in the two manurial trials containing phosphate treatments. Superphosphate has never caused significant responses in clove or other crop trials on the typical red clove soils at Kizimbani, although it has always been felt that these soils were deficient in available phosphate. Sodaphosphate (previously known as silicophosphate) applied to certain annual crops in 1947 caused very significant increases in yield, and it is thought that, whereas superphosphate is probably rendered unavailable in the soil owing to rapid combinations with iron and other elements, sodaphosphate retains its availability. The results so far obtained with annual crops are so striking that it is hoped that the use of sodaphosphate in the clove trials will give results of similar significance within a few years.

85. Secondly, the remarkable growth of the tropical Kudzu cover crop in the K.B.B. block of young cloves leaves no doubt that it is the most suitable cover yet tried in the clove areas. This crop (*Pueraria phaseoloides*) makes a dense cover some two or three feet deep and allows no weed growth to compete with it. Beneath the dense mass the ground is kept cool and moist and covered with a deep layer of rotting fallen leaves. The manner of its growth makes cultivation quite redundant except in the immediate vicinity of the trees, and surface erosion is reduced to a minimum.

86. The very small crop of cloves in the 1947/48 season precluded significant results being obtained in any experiment. As usual with small crops, yields were irregular.

87. In the trial of artificial manuring of clove saplings on Block K.B.B. the trees are all in good physical condition and the tropical Kudzu has made excellent growth, retaining its complete dominance over weeds. The manurial dressings were applied twice during the year, sodaphosphate at the rate of $1\frac{1}{2}$ lbs. per tree having replaced the superphosphate dressing. The yields of the various plots are given in Table I:—

TABLE I.

Treatment		Yield responses to manurial dressings, 1947 (lb. green cloves per tree)	
N	...	0.18	lb.
P	...	-0.08	„
NP	Interaction	-0.69	„
K	...	0.72	„
NK	Interaction	0.61	„
PK	Interaction	-0.31	„
NPK	Interaction	0.51	„

} All insignificant.

The measurements of height, girth and canopy are recorded in Table II:—

TABLE II.

Treatment		Average girth of trees in inches	Average height of trees in feet	Average canopy of trees (8 represents a full canopy)
Control	...	18.2	18.6	4.0
N	...	18.6	19.4	4.8
P	...	18.8	18.1	4.3
NP	...	17.8	19.2	4.4
K	...	19.5	20.0	4.6
NK	...	19.9	19.5	5.7
PK	...	18.8	19.6	4.4
NPK	...	19.0	19.0	4.5

88. In the application of Coconut Meal and Sulphate of Ammonia to Clove Saplings Trial, the quantities of manures applied and the crops harvested are given in Table III. During the *vuli* the cassava interplanted between the rows was removed and replaced by *Pueraria phascoloides*.

TABLE III.

		Coconut Meal			Total yield in lb. per tree for each level of sulphate of ammonia	
Sulphate of Ammonia		0 lb. Meal lb. green cloves per tree	12 lb. Meal lb. green cloves per tree	25 lb. Meal lb. green cloves per tree		
0 lb. per tree	...	0.86	4.11	2.53	...	7.50
1 lb. per tree	...	2.27	1.78	2.89	...	6.94
2 lb. per tree	...	1.39	1.63	1.59	...	4.61
Total yield in lb. per tree for level of coco- nut meal		4.52	7.52	7.01	...	—

89. In the Long Term Manurial Trial with coconut meal the cassava interplanted between the rows was also removed and replaced by *Pueraria*. The yields of cloves harvested are given in Table IV:—

TABLE IV.

<i>Treatment</i>	<i>Average yield in lb. green cloves per tree</i>
Control—no manure	1.77
15 lb. meal per tree per annum	3.62
30 lb. meal per tree per annum	3.46
15 lb. meal per tree per annum (for first 10 years only) ...	3.60
30 lb. meal per tree per annum (for first 10 years only) ...	3.16
15 lb. meal per tree per annum (for second 10 years only)	3.80
30 lb. meal per tree per annum (for second 10 years only)	2.91
Application in proportion to previous crop	2.67

90. The clove trees in the Regeneration of Cloves under various Nurse Crops and Shade Trees Trial planted in 1942 have now commenced to bear small quantities of cloves. Just before the harvest the trees were thinned to leave only one sapling in each planting site. The yields obtained in 1947 are given in Table V. The differences, though interesting, are statistically insignificant:—

TABLE V.

<i>Nurse Crop or Shade Tree</i>	<i>Average yield in lb. green cloves per tree</i>
Sugarcane	0.12
Cassava	0.26
Plantains	0.15
<i>Gliricidia</i>	0.36
<i>Gliricidia</i> (previously with <i>Calopogonium</i> ground cover)	0.53

The size and appearance of the trees demonstrate very definitely that plantains and *Gliricidia* are excellent nurse plants, but the fact that plantains produce a small cash return would tend to make its use the more popular.

91. A new Manurial Establishment Trial to test the effect of artificial manures on clove seedlings was laid down during the year. The experiment is similar to that completed in 1946 except that the plots are spaced wider apart to prevent overlapping of the root systems and that sodaphosphate is being used instead of superphosphate. The germination of the seeds was very irregular, but by the end of the year the plots were reasonably uniform and showed no visual effects of different manurial treatments.

92. The Clove Yield and Indicator Plots were inspected each month for the purpose of recording leaf and bud development. No crop was harvested.

93. *Coconuts*.—The Manuring and Cultivation Experiment on coconuts (KMDC) which was commenced in 1936 was modified in 1943 by discontinuing the different cultivation treatments and by applying heavier manurial dressings. In spite of the treatments, however, no significant result has been obtained, and in 1947 the experiment was finally abandoned. The yields for the last three years were given in last year's report.

The causes of failure in this experiment probably include the inherent variation between the palms, the sour and poorly drained conditions of the soil which probably inhibited the normal take up of fertilisers, and the periodic thefts of nuts which increased experimental error.

94. *Citrus*.—Yields from the orange block at Mdo were again reasonably good and the harvest extended from 6th January until 12th November. The number of oranges harvested was 52,136 an average yield of 176 per tree. At the end of the year the trees were bearing an excellent crop of unripe fruit. The best trees in this block are the source of budwood used in working citrus plants for public distribution.

95. In the citrus nursery the establishment of rough lemon stocks was disappointing and only 4,000 were finally used for budding. The following plants will be ready for distribution to the public in the 1948 *masika*:—

Orange : selected local varieties	2,200
Grapefruit : Triumph variety ...	200
Mandarin	200
Pomelo	250
Smooth Lemon	50
Sweet Lime	50

Some 20,000 rough lemon seeds have been planted for the production of stocks for budding in 1948.

96. *Pineapple*.—The recently imported variety California Red produced fruits for the first time. The shape of the fruit is excellent for canning, but the flavour and texture are poor.

97. *Bananas*.—The collection of 26 local varieties of bananas planted in 1947, came into bearing over the latter half of 1947. The number of bunches produced per plant, the weights of the bunches and the weight of fruit produced per plant are being recorded. It is proposed to try out these varieties in various situations in Zanzibar and Pemba.

98. *Kapok*.—Some 124 seedlings of a local large-podded type of Kapok growing at Ndagaa were purchased and planted in a new block at Kizimbani. The old blocks bore a medium crop which was leased for Shs. 150. From each block sample trees were picked individually and the yields weighed. The yields from these continue to be extremely low.

99. *Rozelle Hemp* (*Hibiscus sabdariffa* var. *altissima*). Seed was introduced from British Guiana and several small plots were established. It is hoped to plant the crop in other areas in 1948 to test the value and usefulness of its fibre.

100. *Oil Palms*.—The harvesting records for the last six years are given in Table VI. The 1947 yields were again low, especially when compared with the yields recorded in other countries, two of the contributory causes being depredations by crows which carry away thousands of the best fruits, and the low efficiency of the oil press. A new oil press of the same type has recently been purchased:—

TABLE VI.

		1942	1943	1944	1945	1946	1947
Number of palms	...	362	362	360	239	339	339
Number of bunches harvested	...	1,068	704	1,050	1,230	1,093	1,187
Average weight per bunch	... lb.	15.8	21.9	30.5	29.3	25.3	32.7
Heaviest bunch	... lb.	48	58	76	68	80	102
Average weight fruit per bunch	... lb.	10.5	16.7	26.0	19.0	16.2	18.5
Average weight oil per bunch	... lb.	1.01	1.24	2.10	1.80	1.45	1.76
Average weight oil per palm	... lb.	—	—	6.4	6.2	4.69	6.19
Weight of oil per 100 lb. fruit	... lb.	6.49	7.52	6.40	9.37	8.96	9.50
Weight of oil prepared	... lb.	728	871	1,747	2,293	1,588	2,100

Table VI shows that the 1947 figures show a general improvement over those for 1946 and the average weight of the bunches was higher than in any previous year.

101. In August, the records of the fruit production of 287 individual palms over a period of six years were examined, and each palm was classified according to the weight of fruit it had produced during that time. The variation in the population was very considerable as is shown in Table VII:—

TABLE VII.

lb. fruit over 6 years	Frequency: number of palms	lb. fruit over 6 years	Frequency: number of palms
0—50	4	651—700	9
51—100	17	701—750	3
101—150	26	751—800	10
151—200	30	801—850	3
201—250	30	851—900	1
251—300	29	901—950	3
301—350	33	951—1000	1
351—400	14	1001—1050	3
401—450	14	1051—1100	—
451—500	16	1101—1150	—
501—550	10	1151—1200	—
551—600	10	1201—1250	1
601—650	10		—
		Total	287

As a result of this study, the recording of the fruit production of the 253 worst palms as individuals has now ceased, and more detailed records, including the measurement of pericarp thickness, have been commenced on each of the 34 best bearing palms.

The block of young oil palms planted in 1942 is growing well and is just coming into bearing.

102. *Aleurites moluccana*.—A small block of 40 local candlenut trees has been planted out. Growth subsequent to establishment has been excellent.

103. *Cocoa*.—The 54 old Java Criollo type cocoa trees at Dunga looked reasonably well but they bore only a small crop in 1947. The monthly production of pods during the last three years is given in Table VIII:—

TABLE VIII.

		<i>Number of pods harvested</i>		
		1945	1946	1947
January	... Not picked	298	255	
February	... "	26	49	
March	... "	29	—	
April	... "	29	—	
May	... "	94	65	
June	... "	4	50	
July	... "	—	—	
August	... "	17	—	
September	... "	14	—	
October	... "	13	148	17
November	... "	47	150	314
December	... "	59	976	125
Total ...		150	1,754	875

From the 875 pods produced in 1947, some 13,600 seeds were planted at Kizimbani to produce seedlings for distributions in 1948.

The seedlings planted in the gaps between the old trees in 1946 have made only slow growth. At the end of the year branches of the *Cassia siamea* trees were lopped to reduce the shade, and the cocoa seedlings were ring hoed and heavily mulched.

104. The eight Forastero type trees at Kinuni Moshi produced only 267 pods during the year as against an average of 468 for the last four years. The trees are in good condition.

105. The following seedlings of Dunga Criollo cocoa were distributed from the Kizimbani nursery during 1947:—

Kizimbani	...	2,298
Selem and Langoni	...	7,937
Mkwajuni	...	363
Langoni prison	...	26
Kinaoni	...	1,450
19 private growers	...	7,653
Total ...		19,707

106. The five-acre cocoa plot planted in 1946 at Kizimbani needed some 1,500 replacements in 1947. In spite of great care and attention the condition of the plants is disappointing and their growth compares very unfavourably with seedlings of the same age at Selem and Kitundu, where the soil is lighter and more sandy. Chrysomelid beetles, and leaf eating weevils were not as troublesome as in 1946 but hand picking and spraying were needed throughout the year.

At the end of the year the appearance of the better plants definitely improved, and they seemed to be growing away from the dieback condition characteristic of smaller plants. The dieback takes the form of patchy discolourations of the young shoots which eventually dry and turn black. Small plants about a foot high produce a succession of shoots which sometimes all dieback in the same way, especially during the dry weather.

107. The growth of the Criollo plants budded on Forastero stocks and planted at Kipange has been quite satisfactory. To the original 36 plants planted out in 1946, some 80 more were added in 1947. No flowers have yet been produced. Several hundred Forastero stocks are being raised for budding in 1948.

108. Of the two cocoa plants which were produced last year from cuttings one is growing very well and the other has been destroyed by white ants.

109. The various cocoa plots under private ownership have been the subject of frequent visits by the staff of the Department of Agriculture.

Advice given to the owners of the plots has unfortunately not always been accepted. In general, the growth of the seedlings has been good on the lighter soils, and where adequate care has been given to the plants the results are very gratifying. In such cases and where the owner showed interest a further allocation of seedlings was given in 1947. Amongst the new plantings, the large block planted by the Public Trustee at Kinaoni is receiving great care and the plants are flourishing.

110. *Coffee*.—The yield of *Liberica* Coffee was most disappointing but this was partly due to the main crop not being ready for harvest before the end of the year, a further 999 lb. being picked in the first three months of 1948. The coffee leaf rust *Hemileia vastatrix* caused considerable damage for the second year in succession.

In the *vuli* season a second plot of *Liberica* coffee was planted in the nursery area. This consists of 429 plants at an espacement of 12 ft. x 12 ft. Poor weather conditions seriously affected the establishment.

The *Excelsa* trees yielded their best crop to date but the very small beans and rather peculiar flavour of this variety make it unpopular to local tastes.

The yields of fresh berry harvested during the past six years are given in Table IX:—

TABLE IX.

Variety	No. of trees Planted			Yields in lb. of fresh berry.					
				1942	1943	1944	1945	1946	1947
<i>Excelsa</i>	...	175	1939	116	380	278	952	889	972
<i>Liberica</i>	...	256	1938	568	962	320	868	2,130	335

Some 354 *Liberica* seedlings were sold to the public.

111. *Chillies*.—The small block of 190 plants of the large Paje type continued to bear until July giving a total yield of 189 lb. fresh chillies. This low yield is considered to be due almost entirely to the theft of fruits by crows. Seedlings of this variety have been raised for the establishment of a larger block in 1948. About 22 lb. of seed were distributed from the station.

112. *Nutmegs*.—To meet a small public demand for nutmeg plants seedlings are being grown from a tree at Kinuni Moshi which bears fairly large fruit.

113. *Derris elliptica*.—The large plot of derris at the nursery is now overdue for digging as it has been reserved to supply a big demand for planting material. One difficulty in harvesting derris in Zanzibar is that weather suitable for easy digging and the planting of cuttings from the lifted plants is not suitable for the rapid drying of the roots.

114. *Pawpaws and Papain*.—Two blocks of Honolulu pawpaws totalling $1\frac{1}{2}$ acres were planted for papain production. The first fruits were nearly ready for tapping at the end of the year, only six months after planting the seed at stake.

A new variety was received from Mauritius, and a few plants are being raised for papain production trials.

A papain drying kiln was constructed at Kizimbani. It is similar in design to those in use in Arusha area of Tanganyika, and consists of a stone-built fire box (with a baffle) from which the hot smoke passes along two horizontal iron flues made from oil drums to a vertical chimney. Stone walls support wooden frames above the hot drums, and the papain is dried on sheets of *calico* stretched on the frames. The cost of the kiln was Shs. 1,426.

115. *Pueraria phaseoloides*.—As reported in the "cloves" section this plant has achieved a complete suppression of *Imperata cylindrica* in the KBB block, and there is every reason to believe that it may be the ideal cover crop for cloves.

The three acres established in the old "annual plots" area have grown well and towards the end of the year the daily cutting of vines commenced for the stall feeding of cattle. It recovers quickly and it will probably be possible to take more than two cuttings each year. The first cutting is yielding approximately 6.1 tons per acre of green fodder.

The crop flowered profusely this year and about 84 lbs. of seed were harvested.

116. *Centrosema pubescens*.—In the Kinuni Moshi coconut block where *Centrosema* has well established itself, it is slowly spreading, suppressing weed growth, including *Imperata* grass, very effectively. Although not so robust as *Pueraria*, and, as a fodder, not so palatable *Centrosema* would seem to be a valuable and permanent cover crop for coconut areas.

About 100 lb. of seed was collected for extending this crop.

117. *Centrosema plumieri*.—A supply of seed was received from Porto Rico and planted in the nursery. It has produced a much heavier cover than *C. pubescens* and more resembles *Pueraria* in appearance and bulk. Its use as a cover crop appears to be very promising and seed is being collected for its extension.

118. *Rice*.—The *masika* rains began about three weeks earlier than usual in 1947 and lasted for about three months. This provided an exceptionally long growing period for rice and the crop grew and yielded unusually well.

119. At Kizimbani rice experimental work consisted mainly in the continuance of variety trials to find out if any varieties yielded better than those previously selected. All the trials, however, except one, gave inconclusive results. In consequence it was decided, with the exception of the varieties recently imported from India and Nigeria, to retain only three of the best varieties and to subject these to a further period of intensive selection before testing them again in variety trials.

It is considered that the local varieties, in spite of preliminary selection, are still very heterozygous and capable of improvement by further selection. The three rices which have been retained for this work are *Mngazija*, and Sokotera (suitable for drier and wetter conditions respectively) and *Shingo la Mjane*.

The imported rices, G.E.B. 24 from Madras and Guiana Creole and Guiana 75 from Nigeria yielded well in the trials and will be subjected to further tests.

120. Apart from the various experiments a considerable area was planted with popular rice varieties in order to conserve seed supplies for distribution to the public. About 23,315 lb. of paddy were reaped. To this quantity of seed the Prison Camps, at which very good crops were also obtained, contributed a further 25,362 lb. of seed rice, receiving a proportionate quantity of white rice in exchange.

The following are the results of the rice experiments:—

RICE VARIETY TRIAL NO. 1.

Latin square, 6 × 6. Kinuni Moshi. Wet conditions.

Variety	Yield (lb. per acre)
Mngazija ...	1,694
Guiana Creole ...	1,861
Guiana 79 ...	1,765
G.E.B. 24 ...	2,259
Malikora 7 ...	1,768
Sokotera ...	1,571

Result.—G.E.B. 24 significantly ($P=0.01$) better than all other varieties.

RICE VARIETY TRIAL NO. 2.

Latin square, 6 × 6. Kinuni Moshi. Drier conditions.

Variety	Yield (lb. per acre)
Mngazija ...	866
N. 14 ...	973
Shingo la Mjane ...	841
Malikora 7 ...	1,014
Cheche 177 ...	701
Afaa 50 ...	701

Result.—No significant differences between yields.

RICE VARIETY TRIAL No. 3.

Latin square, 6 × 6. Kinuni Moshi. Wet conditions.

<i>Variety</i>	<i>Yield (lb. per acre)</i>
Mngazija ...	2,257
Guiana Creole ...	2,412
Guiana 79 ...	2,344
G.E.B. 24 ...	2,271
Malikora 7 ...	2,252
Sokotera ...	2,329

Result.—No significant differences between yields.

RICE VARIETY TRIAL No. 4.

4 Randomised blocks. Chuini. Dry conditions.

<i>Variety</i>	<i>Yield (lb. per acre)</i>
Shingo la Mjane	1,016
Meza ...	968
Afaa ...	1,083
Mngazija ...	958
Sokotera ...	1,085
Cheche ...	950
Waya ...	859
Malikora ...	953
N. 14 ...	889

Result.—No significant differences between yields.

RICE VARIETY TRIAL No. 5.

Latin square, 6 × 6. Kinuni Moshi. Prison Camp. Drier conditions.

Conducted by the Prison Camp personnel through the kindness of the Superintendent.

<i>Variety</i>	<i>Yield (lb. per acre)</i>
Mngazija ...	1,278
N. 14 ...	1,536
Shingo la Mjane	1,607
Malikora ...	1,552
Waya ...	1,640
Afaa ...	1,564

Result.—No significant differences between yields.

121. The results from these trials show how even are the yields of the various types of rice grown on the station. The three varieties chosen for further selection and trial were selected on their performances over several years experimentation, and the reduction in the number of varieties grown will enable selection work to be more intensive.

122. A Rice Composting Experiment was designed to determine the value of applying compost to rice, either in the rice nursery in order to get strong seedlings for planting out, or in the field to assist in subsequent growth, or in both. The results were as follows:—

6 RANDOMISED BLOCKS WITH SPLIT PLOTS. KINUNI MOSHI.

Rather wet conditions. Yields recorded in lbs. per acre.

		Treatment in nursery (compost per acre)			Total
		Nil	16 tons	32 tons	
Treatment in field (com- post per acre)	... nil	1,388	1,775	1,569	1,577
	2 tons	1,635	1,882	1,762	1,760
	4 tons	1,854	1,727	1,705	1,762
	Total ...	1,625	1,794	1,678	

Result.—No significant differences between yields.

There is no reason to suppose, from the evidence of the trial, that applications of compost to rice either in the field or in the nursery are worth while.

123. The results of Rice Fallowing Trial No. 1 were written up in 1947 and published in the *East African Agricultural Journal*, Vol. XII. The experiment was designed to determine the best methods of dealing with rice land between successive crops of rice. Results and observations indicate that increased yields are obtained if after harvest the stubble is burnt, the land thrown up into large ridges, and then planted with a pulse crop such as cow peas. Removal of the weed or pulse trash for composting off the field, the compost being applied later to the rice crop, reduced yields.

124. Rice Fallowing Trial No. 2 was designed to supplement the first trial, mainly to determine the effects of planting sweet potatoes between rice crops. The experiment was ill sited, soil conditions being too variable. During the first three years 1944-46 statistically significant results were obtained only in 1946, when the yield of rice on the plots which had been ridged and left unplanted was significantly superior to that of other treatments. The results of 1947 are given below:—

LATIN SQUARE 5 × 5. KINUNI MOSHI.

Variably Wet Conditions. Fourth Year.

Treatment	Yield (lb. paddy per acre)
Ridging only between rice crops	1,150
Ridging plus pulse planting ...	993
Pulse planted on the flat ...	923
Control—no treatment ...	789
Ridging plus potato planting ...	786

Result.—No significant differences between yields.

This year's results are of the same order as previous results and there is no doubt that the conclusions of Trial No. 1 indicating the value of ridging between rice crops, are reliable. The experiment was abandoned after the 1947 rice harvest.

125. The irrigation channel at Kinuni Moshi, described in the 1946 report, greatly benefited cultivators throughout a large area of the valley. After the 1947 rice harvest the whole area under cultivation by Government was cross-bunded at one foot vertical intervals at right angles to the smaller irrigation channels. In these small channels at intervals corresponding to the cross bunds, small sluices were constructed to divert the irrigation water into the fields on either side of the channel. These sluices consist of earth dams in the channels, through which 4 inch Everite pipes conduct the water. If a pipe is closed the water rises in the channel, and overflows into the rice fields at either side.

126. *Maize*.—The most outstanding result of the year was a manurial experiment with maize, designed to test the value of the artificial manure, sodaphosphate, in combination with lime. This experiment is the first of a series of trials of this manure, which will be carried out over a period of several years. The manure is being produced in small quantities by the East African Industrial Research Board in Kenya from Uganda rock phosphate. It is hoped that it will prove to be of great benefit on typical red clove soils where other forms of phosphate, including superphosphate, appear to become quickly and permanently insoluble when incorporated into the soil.

The design of the experiment is summarised below:—

Layout ... 5 Randomised blocks with split plots.

Treatments ... Sodaphosphate at 260 lb. per acre applied in two ways.

(a) broadcast over the whole plot, and

(b) placed near the seed.

Lime (coarsely ground *Kifusi*) at 1,290 lb. per acre also applied as (a) and (b) above.

The whole block of land was dressed with sulphate of ammonia at 172 lb. per acre and sulphate of potash at 172 lb. per acre as a top dressing immediately after planting.

127. Unfortunately an error in design precluded the responses to the different methods of applying lime being separated in the statistical analysis. However, as it is quite clear from the results that lime, whether applied broadcast or near the seed made no difference to the yield, there was no loss of valuable information and the responses to sodaphosphate were unaffected.

128. A month after planting it was apparent that in the phosphate plots the growth of the young maize was far more vigorous and the leaves were much darker in colour. The harvest results were as follows:—

<i>Treatment</i>	<i>Yield (lb. per acre dry grain)</i>
Phosphate placed near seed ...	1,445
Phosphate scattered ...	1,555
No phosphate ...	919
Average of liming treatments	1,332
Control—no lime ...	1,280

Difference required for 1 per cent significance=406 lb. per acre.

Results.—Sodaphosphate thus increased the yield of maize by 63 per cent ($P=0.01$). This increase was partly due to an increase in the size of cobs and partly to an increase in the number of cobs per acre, as shown below:—

<i>Treatment</i>	<i>Yield (number of cobs per acre)</i>
Phosphate placed near seed	8,426
Phosphate scattered ...	8,656
No phosphate	6,597
Average of liming treatments	8,015
Control—no lime	7,770

The increase in cob number due to phosphate was nearly 30 per cent.

129. *Sorghum.*—The Dwarf Hegari variety was grown in both rainy seasons, but growth was poor and the yields, 93 lb. and 166 lb. per acre were very low.

After the maize in the sodaphosphate experiment had been harvested, the same plots were planted with cowpeas, and, after the cowpeas, Dwarf Hegari millet was planted in the *vuli* rains. This third crop grown without the re-application of fertilisers is not yet mature but gives the impression that residual phosphate is still causing increases in yield.

130. *Cassava.*—The ten varieties imported from Amani in 1936 were reaped and two, Aipin valenca and 4026/20, which appeared to be reasonably resistant to mosaic and streak, are heavy yielders. Small blocks of these have been replanted from disease-free plants. The remaining varieties, 4023/3, 4023/4, 407/3, 4029/11, 4050/1, 4029/17, 405/1 and 37244E were discarded for low yield and heavy virus infection.

131. A 6×6 Latin square variety trial was planted with the five most promising of the Kizimbani seedlings, namely K. Nos. 91, 52, 64, 86 and 137 together with the variety Msitu for comparison. The trial will be reaped in 1948.

132. Several thousand true seeds from the variety *Msitu* were again planted and the seedlings are being rogued as virus symptoms occur. The remaining plants at the end of a year will be replanted as cuttings and further tested. In this way it is hoped that high yielding, palatable and disease resistant varieties may be discovered. So far no seedling variety has proved to be better than the parent *Msitu*.

133. *Sweet Potatoes.*—The varieties Caroline Lea and B44 were planted extensively to produce planting material for public distribution. Sweet potatoes will not grow satisfactorily in dry situations during the hot dry season and there is usually a serious shortage of cuttings amongst cultivators at the beginning of the rains. Vines are therefore planted in damp situations in November and December to provide planting material when most required.

134. *Eddoes*.—The following varieties, new to Zanzibar, were imported from Ceylon and planted at Kinuni Moshi and the nursery:—

Dehiala	Tummasala
Kandala	Gehala
Also <i>Xanthosoma</i> var	Desaala

Neither these nor those previously imported are promising, as there is a great tendency for tubers to sprout prematurely and develop leafy shoots.

135. *Cowpeas*.—After the maize sodaphosphate experiment was reaped the plots were replanted to cowpeas without further manuring. The soda-phosphate plots evidently contained sufficient residual phosphate to cause considerable effects on growth and yield. Not only were heavier yields produced, but the plants ripened about two weeks earlier than on the no-phosphate plots. The results were as follows:—

<i>Treatment (given to previous crop)</i>	<i>Yield (lb. per acre dry seed)</i>
Phosphate near the seed (260 lb. per acre)	785
Phosphate scattered (260 lb. per acre) ...	851
Control—no phosphate	581
Difference required for 1 per cent significance = 153	

The residual sodaphosphate thus increased the yield by 48 per cent. Its effect on hastening the maturity of the plants was proved by the fact that the first picking from the sodaphosphate plots was 60 per cent greater than that from the control plots.

136. *Pigeon Peas*.—A crop of 608 lb. dry peas was reaped from a widely spaced block of 1½ acres.

137. *Vegetables*.—Common native and European vegetables which seed in Zanzibar were sown to obtain seed supplies for public distribution. Various new varieties of imported vegetables were also grown for test purposes.

138. *Compost*.—The making of compost was maintained on a large scale using fresh manure from the Stock farm, crop residues, and domestic refuse from the labour lines. The manufacture of compost at Chwaka from village refuse was also continued.

139. *Co-operation with Prisons Department*.—The Agricultural Officer continued to accompany the Superintendent of Prisons on weekly visits to the Prison Camps throughout the year. Advice was given on Agricultural matters with regard to the growing of crops, the maintenance of fertility, and the production of food to make the prisons as self-supporting as possible. In general, the season was very successful, excellent crops of rice, sweet potatoes and cowpeas being harvested, especially at Kinuni Moshi camp.

Education.

140. *Pupils-in-Training*.—Five pupils in their second year received lectures from the Assistant Agricultural Officer at Kizimbani on Crop Husbandry, Agricultural Botany, Elementary Veterinary Science, Poultry Husbandry, Building Construction, and Elementary Surveying.

For practical work, the pupils were attached individually to different sections of the Station for periods of three months. An examination at the end of the year yielded rather disappointing results, and it may be necessary to recapitulate some of the theoretical instruction.

141. *Animal Husbandry Course for Dole School*.—This course was commenced at Kizimbani in the third term of the year, and was attended by four classes of 19 or 20 boys each from Monday to Thursday respectively. A special milking shed was built and a small herd of six cows was made available to provide facilities for practical training. The boys arrived at the Stock Farm at 6.30 a.m. and all the work connected with the herd, as well as practical work in poultry management was undertaken by them. They were under the supervision of their teacher and the Assistant Veterinary Officer. After breakfast which was sent from the school, lessons were given in the theoretical aspects of stock husbandry. The Monday lectures were given by the Assistant Agricultural Officer and repeated for the remainder of the week by the master in charge. Demonstrations were also given by the Assistant Veterinary Officer and visits were paid to the slaughter house.

The boys enjoyed the practical work—especially milking—and the examination results were quite creditable. The course, which was in the nature of an experiment, was undoubtedly successful, and in 1948 will be extended to include both crop and animal husbandry.

142. *Young Farmers Course*.—All the necessary buildings for the housing, feeding and instruction of twelve farm pupils, together with a teachers house, were erected at Kizimbani during the year and one year courses will commence in January, 1948.

143. *Kichwele Small-Holders*.—The scheme for training and settling twelve ex-servicemen as small-holders continued throughout the year, and the transfer of the men who finished the course was practically completed by the end of December. Their training consisted mainly in carrying out practical work accompanied by lectures and demonstrations. Each small holding consists of about five acres of land on which two acres of crops were already established, a house, and accommodation for stock.

144. *Inter-departmental Course*.—Members of the senior staff, including Senior Agricultural Instructors, attended lectures on various subjects at an inter-departmental course held at the Government School in October. The following lectures were given by Officers of the department:—

Crop Diversification ...	Acting Director of Agriculture.
Growing and Processing of Rice ...	Acting Senior Agricultural Officer.
The Products of the Clove	Agricultural Officer, Kizimbani.
The Importance of Animal Husbandry to the Protectorate ...	Assistant Veterinary Officer.

Stock Farm.

145. *Cattle*.—At the end of the year the cattle at the Kizimbani Stock Farm consisted of the following animals:—

Bulls	...	4
Cows	...	48
Heifers	...	30
Heifer calves	...	37
Bull calves	...	16
Bullocks	...	58
Total		193

146. Various changes in the management were made during the year. Those affecting young calves included the warming of milk before feeding, the addition of lime water daily and of red palm oil twice weekly to the milk, the washing down of the pens with disinfectant every day, and the inoculation of all calves soon after birth with *Bacillus coli* vaccine. Older calves after being weaned were kept longer on a ration of simsim cake, cassava and minerals, and were introduced gradually to being herded at night in open sheds.

147. All adult animals were given a plentiful supply of cut fodder (*Pueraria* or *Panicum*) when penned at night, and the milch herd were penned at night on a rotational system in small paddocks, and supplied with water.

148. A 2 per cent addition of the following mineral mixture was made to the feed of all animals receiving supplementary rations.—

Bone meal	...	43 lb.
Sodium chloride	...	30 "
Lime	...	20 "
Sulphur	...	5 "
Ferric oxide	...	2 "
Potassium iodide		3 oz.

149. A small boiler was erected to enable all milking utensils and calf pails to be boiled daily.

150. The health of the cattle has been very good except for the incidence of white scour and pneumonia in calves. The most unhealthy periods of the year are during very wet weather, when the animals get wet and cold and are tormented by *Stomoxys* flies. During such periods the animals, especially the young ones, rapidly lose condition, and the milk yields fall off.

151. Several cases of infection with Trypanosomiasis (*T. Congolense*) were diagnosed in the herd and *Glossina austeni* was found in two of the station pastures. Treatment with Phenanthridinium 1553 produced excellent results and all animals recovered.

152. Of the tick-borne diseases, two cases of east coast fever both proved fatal. Two deaths were also due to *Piroplasmosis* and one to *Anaplasmosis*.

153. Calf pneumonia, which is thought to be due to *Corynebacterium pyrogenes*, caused the death of four calves. A vaccine was subsequently obtained from Kabete and all young animals were inoculated.

154. Six deaths of calves were caused by white scour but various control measures adopted later in the year appear to have been very successful. Treatment with Sodium tellurite, used in previous years, is fully capable of curing scour, but experience indicates that the treated animals never fully recover their condition, and often die from debility or other diseases during succeeding months. Some success has been achieved by treating cases with Sulphapyridine and arrow-root gruel. More recently a new drug, Sulphamezathine, was purchased for trial, but no case of scour has since occurred.

155. One death from *Haemonchiasis* occurred early in the year, and all animals are now given fortnightly drenches of copper sulphate.

156. There was also a small outbreak of cow-pox and a single case of mastitis.

157. The selection and breeding policy instituted six years ago was continued. In 1947, eight cows were culled from the herd as the result of low milk production during their first and second lactations.

158. The value of Ngong bull No. 11 as a sire, which was assessed by comparing the lactations of his daughters with those of their dams, has proved to be very disappointing. Daughters of poor dams have shown, if anything, worse milking qualities than their dams. This bull has therefore been withdrawn. Other bulls are now being tested by allowing each one to serve about fifty cows in succession and then withdrawing it from the herd until such time as its influence on its progeny can be assessed.

159. An examination of the records of the first lactations of all locally bought native cows recorded at Kizimbani shows the following distribution for 47 cows:—

Lactation (lb. milk)	Frequency (per cent)
2,001 — 2,250	8.5
1,751 — 2,000	10.6
1,501 — 1,750	6.4
1,251 — 1,500	8.5
1,001 — 1,250	8.5
751 — 1,000	4.3
501 — 750	4.3
251 — 500	2.1
0 — 250	46.8

Even allowing for those cows which give very small first lactations for temperamental reasons, it appears from these figures that the local breeding material is divided into two groups:—

- (a) good milkers whose first lactations are distributed round the 1,500—2,000 lb. mark, and
- (b) a similar proportion of useless animals.

From the breeders' point of view, such material is very suitable for selection work.

160. The monthly milk indices for 1947 which indicate the average number of pounds of milk given per day for all cows in milk are compared with those for the previous five years in the following table:—

Average	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.	Whole year
1942-46	6.6	6.8	6.3	5.9	5.7	5.6	5.7	5.5	6.1	6.4	6.8	6.7	6.2
1947	5.1	5.1	5.2	5.2	5.6	6.2	6.3	6.5	6.9	7.1	6.8	7.5	6.1

The index was very low at the beginning of 1947, but gradually improved. The index for December has not previously been surpassed.

161. A better figure for assessing the qualities of single cows is the accepted individual milk index calculated by dividing the number of pounds of milk in the lactation by the number of days between calvings. For the Kizimbani herd the milk indices calculated in this way are distributed as follows:—

Milk index of individual Cows		Frequency (per cent)	
		1946	1947
11—12	...	2.6	...
10—11	...	—	...
9—10	...	—	2.4
8—9	...	—	2.4
7—8	...	15.8	9.8
6—7	...	2.6	12.2
5—6	...	13.2	19.6
4—5	...	7.9	14.6
3—4	...	15.8	12.2
2—1	...	7.9	7.3
1—2	...	2.6	7.3
0—1	...	31.6	12.2
No. of cows	...	38	41

Thus, apart from the one especially good lactation in 1946, there has been a definite improvement, indicated by a much more normal distribution of frequencies, and a definite upward trend.

162. An experiment laid down to find out the effect of simple cultural treatments and measures on pastures indicated that

- surface hoeing encouraged weed growth and decreased the growths of *Panicum trichocladium*
- disc harrowing encouraged the growth of both weeds and *Panicum*
- slashing decreased weed growth and encouraged growth of *Panicum*
- Sulphate of ammonia (one cwt. per acre) increased the growth of *Panicum* and to a lesser extent of weeds
- farmyard manure increased the growth of *Panicum* and weeds
- sodaphosphate increased the growth of *Dolichos hosei*.

The tentative conclusion has been reached that a rapid improvement in neglected pastures can be effected by slashing, and by manuring especially, with sulphate of ammonia.

163. In an effort to collect and establish blocks of various grasses suitable for use for grazing and for cut fodders, the following grasses were planted in 1948:—

Panicum trichocladium.

Paspalum notatum.

Digitaria sp. ("Jangombe").

Kavirondo perennial sorghum.

Melinis minutiflora (Molasses grass).

Panicum maximum.

Pennisetum purpureum.

164. *Goats.*—The goat herd at Kizimbani was maintained, but the health and appearance of the animals has been far from satisfactory. Some 21 kids were born during the year and 16 animals died. The chief cause of death was *hæmonchiasis*, but the introduction of regular dosing with Phenothiazine early in the year eventually brought all worm diseases under control. The effectiveness of the control was probably much enhanced by reducing the chances of re-infection by the routine fortnightly drenching of cattle with copper sulphate which was adopted during the year.

The goats are still unthrifty, however, and all those purchased from Tanganyika give little milk beyond the requirement of their kids. Allowing the kids to suck their mothers before milking has increased the quantity of milk produced, and the best nanny (purchased locally and of Indian origin) has given as much as 2 lb. per day extra to the milk taken by her kid. The herd at the end of the year consisted of 35 animals.

165. *Sheep.*—The small herd of Somaliland sheep remained in reasonably good health. One ewe died from *hæmonchiasis*, and two lambs were successfully reared. The herd consists of one ram, 3 ewes and two lambs. It is hoped in the near future to transfer these animals to a drier and more suitable area.

166. The existence of a cattle dip at the Stock Farm, and the infection by ticks of some of the stock farm animals with east coast fever, led to the introduction of legislation in December, 1947, to compel all cattle owners in the Dole Shehia to dip their animals once a week. Very useful experience is thus being gained before embarking on dipping on a larger scale.

Veterinary and Animal Husbandry.

167. The health of the livestock population has again remained good and there have been no major outbreaks of epidemic disease, except for contagious conjunctivitis in Pemba.

168. This disease has caused a good deal of trouble in that it can spread with great rapidity and untreated animals in some cases lose their sight. Treatment and isolation of infected herds have been reasonably successful.

169. Three hundred and thirty-eight bovines, mainly from Mangapwani, Mwera, and Fuoni areas were on examination found to be infected with trypanosomiasis and treated with Phenanthridinium 1553. This has shown excellent results.

170. The Public Works Department carried out further work on the Mtoni Dairies, including storm drains, repairs to the approach roads, and extensive repairs to the fencing.

171. So far as poultry are concerned the year at Kizimbani was devoted to building up stocks. There were no further outbreaks of Newcastle virus or other disease reported in Zanzibar but one or two small outbreaks of the former occurred in Pemba.

172. The cattle census in Pemba was completed during the year with the following result:—

<i>Mudirias</i>		<i>Bulls</i>	<i>Cows</i>	<i>Heifers</i>	<i>Bull calves</i>	<i>Heifer calves</i>	<i>Total</i>
Matangatiwani	...	728	2,252	1,076	695	429	5,180
Wete	...	499	854	505	186	109	2,153
Piki	...	546	1,303	901	260	122	3,132
Kisiwani	...	167	700	360	277	131	1,635
Chake Chake	...	217	1,230	549	539	285	2,820
Chonga	...	48	932	408	372	225	1,985
Jambangome	...	39	288	115	72	44	558
Kengeja	...	201	867	409	291	130	1,698
Mkoani	...	137	716	367	239	208	1,667
Total	...	2,582	9,142	4,690	2,931	1,683	21,028

These figures correspond very closely with our previous estimate which was based on the Registration figures for 1942 and Rinderpest figures for 1944.

173. Blood slides of 1,023 bovines were taken at the Veterinary Laboratory during the year of which 338 were positive for trypanosomiasis, 11 for east coast fever, 6 for anaplasmosis and 6 for piroplasmosis.

1,058 mammals and 12 birds were treated at the Zanzibar clinic during the year.

174. Comparative importations from the mainland for the years 1947 and 1946 were as follows:—

		1946	1947
Oxen	...	2,177	2,370
Cows	...	117	262
Calves	...	72	99
Goats	...	9,490	11,669
Sheep	...	1,215	1,664
Donkeys	...	46	101
Horses	...	3	3

These figures indicate some increase in purchasing power, which is also borne out by the abattoir slaughtering figures.

175. Animals slaughtered at the Zanzibar abattoir during the year were as follows:—

		<i>Cattle</i>	<i>Goats</i>	<i>Sheep</i>
Imported	...	2,330	10,210	1,241
Local	...	427	1,609	—
Total	...	2,757	11,819	1,241

176. Pemba slaughterings of bovine were as follows:—

		<i>Wete</i>	<i>Chake Kengeja</i>			
	<i>Matangatuwani</i>	<i>Piki</i>	<i>Ziwani</i>	<i>Chonga</i>	<i>Mkoani</i>	<i>Total</i>
Districts	... 297	894	211	1,004	534	2,940
Townships	... —	924	—	584	158	1,666

This total of 4,606 animals compares with 3,581 in the previous year and 2,268 in 1945, again indicating some increase of money in the hands of the people.

177. 42 slaughter stock were imported via Zanzibar to Pemba, but the danger of introducing trypanosomiasis and the labour and supervision required in making proper quarantine arrangements led to these imports being discontinued.

Produce Inspection.

178. During the year under review the Inspector of Produce was absent on leave from the 23rd May until the end of the year, and Mr. G. J. Natha, Senior Examiner, was in charge of the section.

179. The quantities of cloves passed for export, under the Agricultural Produce (Export) Decree, are shown below in their respective grades.

<i>Month</i>	<i>Grade II</i>	<i>Grade III</i>	<i>Total passed</i>
	<i>Bales</i>	<i>Bales</i>	<i>Bales</i>
January	... 19,733	500	20,233
February	... 5,266	300	5,566
March	... 16,518	692	17,210
April	... 1,582	—	1,582
May	... 2,320	—	2,320
June	... 11,586	75	11,611
July	... 4,108	—	4,108
August	... 5,227	303	5,530
September	... 7,592	500	8,092
October	... 3,976	460	4,436
November	... 9,365	850	10,215
December	... 3,767	—	3,767
Total	... 90,990	3,680	94,670

All cloves were packed in the Inspection Shed.

180. The percentage of grade III was 3.9 as compared with 3.5 in 1946 and 2.6 in 1945.

181. The results of the examinations of cloves and clove stems for adulteration were as follows:—

<i>CLOVES IN BAGS</i>		<i>FAILED FOR</i>				
<i>Origin</i>	<i>Total deliveries</i>	<i>Passed</i>	<i>Excessive moisture</i>	<i>Extraneous matter</i>	<i>Per cent failure</i>	
Zanzibar	... 41,107	... 39,525	... 1,444	... 138	... 4	
Pemba	... 171,912	... 163,287	... 7,910	... 715	... 5	
Total	... 213,019	202,812	9,354	853	4.4	
<i>CLOVE-STEMS IN BAGS</i>						
Zanzibar	... 23,839	... 21,984	... 761	... 1,094	... 8	
Pemba	... Nil	... Nil	... Nil	... Nil		

182. The following are details of the bags of copra which passed through the Zanzibar Market during the year and examined for adulteration:—

Origin	Total deliveries	Passed	FAILED FOR		Per cent failure
			Excessive moisture	Extraneous matter	
Zanzibar ...	131,872	121,650	9,158	1,064	8
Pemba ...	48,953	47,757	1,183	13	2
Total ...	180,825	169,407	10,341	1,077	6

It is not of course compulsory for copra to pass through the market. Zanzibar copra examined was classified as 81 per cent kiln dried, 7 per cent smoke dried, and 12 per cent sun dried.

183. The Inspector of Produce continued to take samples of coconut oil and clove and stem oil in order to ensure that exports conformed with Ministry of Food requirements.

184. 4,621 tons of mangrove bark and 5 tons of chillies were passed as fit for export.

185. Comparative produce arrivals for the year 1944 to 1947 were as follows:—

Produce	1944 Bags	1945 Bags	1946 Bags	1947 Bags
Zanzibar cloves ...	60,305	25,879	18,680	41,107
Pemba cloves ...	169,203	76,916	197,100	171,912
Zanzibar copra ...	174,782	159,634	159,315	131,872
Pemba copra ...	63,864	62,894	47,591	48,953
Zanzibar stems ...	17,327	16,799	4,082	28,839
Pemba stems (Pemba inspection figures) ...	103,520	46,338	56,081	128,033

Chemical Laboratory.

186. Mr. A. K. Briant acted as Government Chemist up to 5th May, on which date Mr. W. E. Calton arrived on transfer from Tanganyika. Mr. Calton reports as follows:—

187. Comparative figures of the total number of samples received for analysis are as follows:—

Year	1938	1939	1940	1941	1942	1943	1944	1945	1946	1947
Number of samples	791	413	391	1,085	2,458	1,779	1,338	931	675	933

Of the 933 samples examined during the year under review 918 came from Government Departments and 15 from private firms. The fluctuations from year to year are almost entirely due to the varying amount of work done for the Agricultural Department. Customs and Police work remain about constant.

Fees collected during the year totalled Shs. 334/50 as against Shs. 262/50 in 1946. These do not include fees for the examination of coconut oil.

188. Details of the Government samples are as follows:—

Agriculture	...	Clove oil, 70; Cattle dip, 100; Water, 9; Coconut oil, 299; Copra, 17; <i>Aleurites moluccana</i> , 2; Mangrove bark, 3; Ghees, 6; Soap, 3; Tallow, 1; Milk, 4; Fertilisers, 2; Cassava flour, 1.
Health Office	...	Milk, 228; Sugar, 10; Soda water, 5.
Police	...	Opium, 4; Bhang, 77; Alcoholic liquors, 9; Cassava, 1; Toxicological exhibits, 4; Bhang smoking apparatus, 1; Suspected Tincture of Digitalis, 1.
Customs	...	Methylated spirits, 4; Vinegar, 2; Rubber, 1.
Public Works	...	Water, 42; Water deposit, 1.
Pathologist	...	Waters, 8; Viscera, 1.
Government Chemist,	...	Soils, 2.
Dar es Salaam		

189. Notes on the more important samples.

Agriculture.—Stem and bud oil samples have maintained a satisfactory eugenol content throughout the year. Samples of *Aleurites moluccana* oil were examined and found to be a useful drying oil, though without the special properties of Tung Oil.

190. The quality of coconut oil examined fell off during the last quarter of the year, 16 per cent of the samples submitted failing to reach the required standards. This is due to the desire for maximum exports leading to inadequate filtering and settling.

191. Samples of fibrous mangrove bark were markedly superior in tannin content to non-fibrous bark owing to the poor quality of the latter.

192. The “vegetable” ghees examined proved to be a mixture of coconut oil and tallow with ghee flavouring.

193. Samples of locally prepared soap were usually found either to be under saponified or to contain an excess of caustic soda. In order to encourage soap makers to bring in their products for examination the charge per sample was reduced from Shs. 25 to Shs. 5.

194. *Health*.—Approximately 15 per cent of the milk samples examined were found to contain added water.

The adulteration rate quarter by quarter was as follows:—

1st	2nd	3rd	4th
Percent	Percent	Percent	Percent
21	4	27	4

This suggests that adulteration is largely caused by shortage of milk.

195. One of the toxicological exhibits examined consisted of cassava root and the following analytical results may be of interest.

Whole root as received	...	2.5	mgm.	Hydrocyanic acid per 100 gms.
Raw, skinned; often eaten as a snack	...	1.3	“	“ “ “ “ “ “ “
Skinned and boiled	...	0.0	“	“ “ “ “ “ “ “
Skinned and roasted	...	0.1	“	“ “ “ “ “ “ “
Whole root, mean of 101 Tanganyika varieties	...	15.8	“	“ “ “ “ “ “ “

The quantities of hydrocyanic acid in the local root as commonly prepared for eating are therefore negligible. Massive quantities of the raw skinned root would have to be eaten at a time to furnish a dangerous dose of the poison.

196. The District Administration was issued with 7,300 arsenite baits for poisoning wild pig.

Soil Investigation.

197. This work was begun in May and has entailed some 1,442 miles travelling by road and numerous journeys by foot where roads do not exist. 377 soil and rock samples have been collected to-date and a somewhat limited scheme of laboratory examination carried out on the more important samples collected. A reconnaissance report on the soils of Zanzibar Island has been prepared and the distribution of soil types mapped on the scale of $\frac{1}{2}$ " to the mile. Pemba has been visited for a short period and some appreciation of its soil resources obtained.

198. Previous work by Messrs. G. Milne and L. W. Raymond on the soils of the Protectorate was published in a Provisional Soil Map of East Africa in 1936. The present writer has felt obliged to examine the classification of Zanzibar soils *de novo*. Milne and Raymond's special class of Mottled Clays were difficult to recognise and mottled types, it is felt, are better classified as catenary associates of the red earths. The terms 'laterised' and 'non-laterised', in view of the development in clay mineralogy, appear to have lost their usefulness.

199. The main groups of Zanzibar soils are based as follows:—

- I. On limestones, weathering without check to drainage.
- II. On non-calcareous sediments, draining according to texture and topography.
- III. On marly or clayey parent material weathering sluggishly at any topographic level.

In relation to the great soil groups of the world the nearest equivalents appear to be Terra Rosa, Red Earth and Rendzina respectively. It is proposed to adopt tentatively the nearest Kiswahili words and use them in a technical sense, as follows:—

Group I—*Kinongo* (commonly meaning a red loamy soil);

Group II—*Changa* (*Mchanga*=soil, a certain sandiness implied), and

Group III—*Namo* (*Kinamo*=any type of sticky soil).

200. The *Kinongo* types range from deep red loams to vestigial humic soils and are inherently the most fertile soils of the island. The *Changa* soils present a sequence of a different character and range from deep reddish soils through orange brown loams to grey sluggishly draining sands. The *Namo* types are a miscellaneous group and include true Humus-Carbonate soils (*Rendzina*), heavy brown soils and grey clays. Cloves are planted to

the deeper *Kinongo* and *Changa* types but do better on the former. The shallower *Kinongo* soils are well suited to citrus and a variety of food crops but the very shallow phases, of which a considerable area exists, are difficult to utilise, the main problem being their inherent aridity. The nutrient status of these types is illustrated by the following mean figures for a number of samples:—

			pH.	Organic matter per cent	Exchangeable calcium ml per cent	Available phosphorus (Truog) (ppm)
KINONGO TOPSOILS:						
Deeper phase	...	...	6.4	3.3	12.0	43
Shallow phase	...	...	6.8	4.9	25.5	148
Very shallow phase	...	...	7.0	11.7	45.5	184
Vestigial phase (rocky)	...	...	8.0	35.0	(high)	107
CHANGA TOPSOILS.						
Free draining phase	...	...	5.6	1.5	3.9	15

These figures are means of concordant values and represent real differences in fertility. The most striking difference is between the deeper *Kinongo* and the *Changa* which are superficially rather similar soils. The *Kinongo* soils show increasing fertility with decreasing depth of profile, which is offset, as indicated above, by decreasing water holding capacity.

The reddish *Changa* types, where not under cloves and the less well drained soils of this group support mainly foodcrops with poor to moderately good results. *Namo* soils furnish good rice land in places and heavy land, mainly unutilised at the present, whose existence may be of importance as a future reserve.

201. Pemba reconnaissance showed the soils of this island to be markedly different from and rather more fertile than those of Zanzibar Island. Briefly the soils of Pemba consist of Fue types, truncated reddish brown soils on variable sedimentary parent material, with relatively fresh minerals within root range of perennial crops, and mainly under cloves; light coloured fertile sandy soils mainly under foodcrops, and apparently owing their fertility to calcareous parent material; and a type resembling the shallow *Kinongo* of Zanzibar but of a much browner colour though showing the same high intrinsic fertility. Minor types are Rendzina and Heath-sands.

202. The knowledge of the soils of the Protectorate and their distribution so far obtained has helped in the selection of sites for Fertiliser Experiments and will be of value in the application of the results obtained.

203. Some detailed investigations have been carried out on cocoa soils, the necessity arising from the fact that Criollo flourishes at Selem but is very backward at Kizimbani. Climatic conditions are similar and the reason

for the difference appears to be due to soil conditions. The composition of the Selem and Kizimbani Cocoa soils in relation to Trinidad Cocoa soils is as follows:—

		<i>Index of Texture</i>	<i>pH.</i>	<i>Exchangeable potassium ml per cent</i>	<i>Organic matter per cent</i>	<i>Total nitrogen</i>	<i>C/N ratio</i>	<i>Available phosphorus (Truog) (ppm)</i>
Kizimbani 1	...	16.7	5.7	0.32	1.5	0.10	8.9	14
„ 2	...	21.7	5.7	0.35	1.5	0.09	9.4	11
Selem 1	...	3.8	5.5	0.09	1.1	0.06	11.0	13
„ 2	...	5.1	5.5	0.19	1.2	0.06	11.3	11
„ 3	...	6.6	5.5	0.09	1.6	0.07	13.1	17
Lower limits of adequacy (sandy soil)	...	(10)	5.8	0.21	3.0	0.20	8.5	13
Trinidad Cocoa soils (clay soils)	...	(36)	6.0	0.37	4.0	0.25	9.5	22

Selem is superior to Kizimbani in C/N Ratio only, while Selem is inferior to Kizimbani in exchangeable potassium. Both are markedly deficient in organic matter and total nitrogen by Trinidad standards and available phosphorus and potassium are on the borderline of adequacy. The solution of this problem may lie outside chemical factors and some tests of the moisture constants of Selem and Kizimbani soils have been made. The following results have been obtained:—

		<i>Estimated moisture at pF 5.5 (equilibrium with ruling atmospheric condition) per cent</i>	<i>Moisture at pF 4.2 (Wilting point moisture) per cent</i>	<i>Moisture at pF 2.9 (maximum water holding capacity under free drainage) per cent</i>
Kizimbani topsoils	...	6.5	12.8	19.8
Selem topsoils	...	3.5	7.0	13.6

The significance of these results is that the dried out soil at Kizimbani will absorb 0.28 in. of rain before any is available to plants, whereas less, 0.16 in., is required at Selem. In 1946 the monthly average rain per rainy day at Kizimbani only exceeded 0.28 in. during six months, whereas at Selem is exceeded 0.16 in. during nine months.

Further moisture tests of soils supporting cocoa are being made to find out if this is of general significance in the selection of suitable soils for this crop.

204. Comparative tests of the nitrifying capacity of Selem and Kizimbani soils have been started and on the basis of the results obtained the possibility of modifying their C/N ratios will be studied.

SECTION III.

LEGISLATION.

205. The following legislation was enacted during the year:—

		DATE
Government Notice No. 14 ...	The Defence (Preparation of Rice Land) (Pemba) Order, 1947 ...	18— 1—47
Decree No. 7 ...	The Clove (Amendment) Decree, 1947 ...	8— 3—47
Decree No. 8 ...	The Land Alienation (Amendment) Decree, 1947 ...	8— 3—47
Government Notice No. 29 ...	The Adulteration of Produce Rules, 1947	29— 3—47
Government Notice No. 30 ...	The Clove (Minimum Percentage of Exported Cloves) Order, 1947 ...	29— 3—47
Government Notice No. 54 ...	The Defence (Planting of Cassava) (Pemba) Order, 1947 ...	7— 6—47
Decree No. 11 ...	The Manufacture of Oil of Cloves (Amendment) Decree, 1947 ...	21— 6—47
Decree No. 12 ...	The Copra Cess Decree, 1947 ...	21— 6—47
Government Notice No. 69 ...	The Defence (Planting of Pulses and Sweet Potatoes) (Zanzibar) Order, 1947 ...	28— 6—47
Government Notice No. 70 ...	Exemption under the Woodcutting Decree, 1945 ...	5— 7—47
Government Notice No. 71 ...	Declaration of Reserved Areas under the Woodcutting Decree, 1945 ...	5— 7—47
Government Notice No. 81 ...	The Clove (Clove-Bag Levy) Order, 1947	19— 7—47
Government Notice No. 90 ...	The Agricultural Produce Export (Mangrove Bark) (Amendment) Rules, 1947 ...	16— 8—47
Government Notice No. 99 ...	The Copra Cess Collection Order, 1947 ...	30— 8—47
Government Notice No. 107 ...	The Defence (Planting of Pulses and Sweet Potatoes) (Pemba) Order, 1947 ...	4—10—47
Government Notice No. 128 ...	The Agricultural Produce Export (Mangrove Bark) (Amendment) (No. 2) Rules, 1947 ...	29—11—47
Government Notice No. 132 ...	The Diseases of Animals Rules ...	6—12—47
Government Notice No. 135 ...	The Defence (Preparation of Rice Land) (Zanzibar) Order, 1947 ...	13—12—47
Government Notice No. 143 ...	Date of Coming into force of the Agricultural Produce Export (Mangrove Bark) (Amendment) (No. 2) Rules, 1947 ...	20—12—47
Government Notice No. 153 ...	Specification of Mangrove tree for the purposes of the Adulteration of Produce Decree ...	30—12—47
Government Notice No. 154 ...	Specification of species of Mangrove Tree	30—12—47
Decree No. 18 ...	The Woodcutting (Amendment) Decree, 1947 ...	30—12—47
Decree No. 19 ...	The Land Alienation (Amendment) (No. 2) Decree, 1947 ...	30—12—47
Decree No. 29 ...	The Adulteration of Produce (Amendment) Decree, 1947 ...	30—12—47

206. *Government Notices Nos. 14, 54, 69, 107, and 135.*

These notices are cultivation and planting orders made under the Defence (Land Requisition and Personal Service) Regulations, 1943, with the object of increasing the production of foodstuffs for local consumption.

207. *Decree No. 7.*—Amends the Clove Decree No. 8 of 1938 by increasing the maximum levy on exported cloves from 50 cents to Sh. 1 per 100 lb. to defray the cost incurred by the Clove Growers Association in supplying gunny bags to persons engaged in the clove industry.

208. *Decrees Nos. 8 and 19.*—Sections 2 and 9 of the Land Alienation Decree No. 9 of 1939 are amended by clarifying the definition of the word "debt".

209. *Government Notice No. 29.*—This notice, made under the Adulteration of Produce Decree (Cap. 120), lays down the rates of overtime payable for the inspection of produce.

210. *Government Notice No. 30.*—This Order made under the Clove Decree No. 9 of 1938, exempts exporters from purchasing a certain percentage of each shipment of cloves from the Clove Growers Association, as stocks in the hands of the Association were very small.

211. *Decree No. 11.*—This Decree amends the manufacture of Oil of Clove Decree (Cap. 117), and enables the British Resident to exempt the Clove Growers Association from the Rules made, or to make new rules under the principal decree in order to allow the Association to foster the production and marketing of agricultural produce.

212. *Decree No. 12.*—By this Decree it is possible to impose a levy on the exports of copra, coconut oil and locally manufactured soap with the object of utilising the money so collected for the general betterment of the coconut industry as may be decided upon by a Board of Management.

213. *Government Notice No. 70.*—This notice made under the Wood-cutting Decree No. 18 of 1945, allows all persons who are entitled to do so by local or tribal customs, to cut and remove wood from Government land without the payment of any fees or royalty provided that the wood cut is required for personal use as firewood or as materials for buildings or agricultural development.

214. *Government Notice No. 71.*—This notice made under the Wood-cutting Decree No. 18 of 1945, prohibits woodcutting in certain areas to allow regeneration of the forests to take place.

215. *Government Notice No. 81.*—This order made under the Clove Decree No. 8 of 1938, imposes a levy of one shilling on every 100 lb. of cloves exported to defray the cost of clove bags supplied by the Clove Growers Association.

216. *Government Notice No. 90.*—This notice made under the Agricultural Produce Export Decree (Cap. 116) amends section 8 of the Agricultural Produce Export (Mangrove Bark) Rules, 1945, and imposes standards for the grading of mangrove bark prior to export.

217. *Government Notice No. 99.*—This order made under the Copra Cess Decree No. 12 of 1947, fixes the levies payable on copra, coconut oil and soap exported and the dates of their coming into force.

218. *Government Notice No. 128.*—These rules made under the Agricultural Produce Export Decree (Cap. 116) revokes Government Notice No. 90 of 1947 and specifies new standards for mangrove bark intended for export.

219. *Government Notice No. 132.*—By this notice made under the Diseases of Animals Decree (Cap. 128) the dipping of cattle is made compulsory in the Dole Shehia in Zanzibar.

220. *Government Notice No. 143.*—By this notice the Agricultural Produce Export (Mangrove Bark) (Amendment) (No. 2) Rules, 1947 (Government Notice No. 128), are to come into force as from 1st March, 1948.

221. *Government Notice No. 153.*—With effect from 1st January, 1948, *Bruguiera gymnorrhiza* is declared to be a mangrove tree under the Adulteration of Produce Decree (Cap. 120).

222. *Government Notice No. 154.*—By this notice *Bruguiera gymnorrhiza* is declared to be a mangrove tree under the Agricultural Produce Export Decree (Cap. 116).

223. *Decree No. 18.*—This Decree amends the Woodcutting Decree No. 18 of 1945, and makes it possible for the cutting of mangrove trees and the stripping of mangrove bark on Government land to be controlled.

224. *Decree No. 29.*—This Decree amends the Adulteration of Produce Decree (Cap. 120) and prohibits the export of mangrove bark of inferior quality or containing bark from any tree except from species of mangrove specified by the Director of Agriculture.

225. As previously stated the year shewed no improvement in the staff position and I wish to acknowledge the constant hard work on the part of the Departmental staff which has rendered possible the progress achieved.

As usual the Department worked in the closest co-operation with the District Administration.

O. S. SWAINSON,
Director of Agriculture.

Appendix I

**STATEMENT OF
REVENUE AND EXPENDITURE OF GOVERNMENT PLANTATIONS.**

Revenue.

				Shs.	cts.	Shs.	cts.
Cloves	...	...	...	36,329	12		
Coconuts	...	...	...	145,901	51		
Miscellaneous	...	...	...	7,373	60		
Leased Plantations	...	...	...	1,200	00		
				190,804	23		
<i>Less</i> value of Produce brought over from							
1946	...	...	...	14,738	59		
				176,065	64		
<i>Add</i> value of Produce carried over to 1948				25,962	94	202,028	58

Expenditure.

Personal Emoluments	...	...	...	40,604	24		
Other Charges	...	...	...	178,094	39	218,698	63
Expenditure exceeds Revenue by Shs.				16,370	63		

Appendix II

REVENUE AND EXPENDITURE OF GOVERNMENT PLANTATIONS.

REVENUE.

	<i>Kidichi</i>		<i>Selem</i>		<i>Mtoni</i>		<i>Chukwani</i>		<i>Total</i>	
Sale of :	Shs.	cts.	Shs.	cts.	Shs.	cts.	Shs.	cts.	Shs.	cts.
Cloves and stems ...	27,556	28	8,772	84	—	—	—	—	36,329	12
Copra ...	73,872	09	19,097	54	23,429	40	10,320	42	126,719	45
Coconuts ...	14,215	02	11	48	13	50	2,445	06	16,685	06
Coconut crops ...	—	—	183	00	1,726	00	588	00	2,497	00
Miscellaneous ...	2,789	92	399	03	4,122	65	62	00	7,373	60
Leased plantations ...	—	—	1,200	00	—	—	—	—	1,200	00
	118,433	31	29,663	89	29,291	55	13,415	48	190,804	23
Less value of produce brought forward ...	10,143	64	1,751	35	1,573	80	1,269	80	14,738	59
	108,289	67	27,912	54	27,717	75	12,145	68	176,065	64
Add value of produce carried forward :										
Cloves ...	68	00	821	28	—	—	—	—	889	28
Copra ...	7,451	30	3,013	74	4,999	30	3,097	22	18,561	56
Coconuts at Shs. 85 per 1,000 ...	6,512	10	—	—	—	—	—	—	6,512	10
Total Revenue ...	122,321	07	31,747	56	32,717	05	15,242	90	202,028	58

EXPENDITURE.

	<i>Kidichi</i>		<i>Selem</i>		<i>Mtoni</i>		<i>Chukwani</i>		<i>Total</i>	
Personal emoluments ...	5,886	00	2,650	00	2,457	00	1,651	50	12,644	50
Transport expenses ...	3,405	95	1,862	96	665	06	480	61	6,414	58
Materials and tools ...	924	98	256	78	50	40	96	20	1,328	36
Labour ...	90,937	35	28,612	53	24,107	13	14,393	78	158,050	79
Repairs to buildings, etc.	4,047	97	750	17	1,236	27	1,869	02	7,903	43
Compost making ...	—	—	—	—	4,397	73	—	—	4,397	73
Total Expenditure ...	105,202	25	34,132	44	32,913	59	18,491	11	190,739	39
PROFIT ...	17,118	82	—	—	—	—	—	—	17,118	82
LOSS ...	—	—	2,384	88	196	54	3,248	21	5,829	63
					NET GAIN	Shs. ...			11,289	19

Appendix III

Approximate Production of Cloves in Frasilas of 35 lb. for 35 Crop Years.

(1st July to 30th June)

(Based on receipts of clove at the Central Market and C.G. A.).

<i>Season</i>	<i>Zanzibar. Frasilas</i>	<i>Pemba. Frasilas</i>	<i>Total Frasilas</i>	<i>Mean crop per season in 5-year periods Frasilas</i>
1912/13	31,018	104,368	135,386	—
1913/14	145,586	638,094	783,680	—
1914/15	194,920	331,389	526,309	—
1915/16	141,641	655,116	796,757	—
1916/17	208,716	302,919	511,635	550,800
1917/18	63,958	234,239	298,197	583,300
1918/19	259,273	565,229	824,502	591,500
1919/20	93,847	168,703	262,550	538,700
1920/21	231,831	316,446	548,277	489,000
1921/22	65,819	200,983	266,802	440,100
1922/23	291,417	690,498	981,915	576,800
1923/24	75,027	236,767	311,794	474,300
1924/25	240,952	520,490	761,442	574,000
1925/26	219,192	392,622	611,814	586,800
1926/27	203,843	529,186	733,029	680,000
1927/28	190,370	500,332	690,752	621,800
1928/29	74,828	125,740	200,568	599,500
1929/30	318,647	610,296	928,943	633,000
1930/31	51,796	201,320	253,116	561,300
1931/32	175,070	760,786	935,856	601,800
1932/33	242,772	244,594	487,366	561,200
1933/34	146,098	781,090	927,188	706,500
1934/35	360,037	503,415	863,452	693,400
1935/36	65,938	232,571	298,509	702,500
1936/37	45,096	351,568	396,664	594,600
1937/38	446,500	909,416	1,355,916	768,300
1938/39	39,879	115,211	155,090	612,000
1939/40	168,041	501,474	669,515	575,100
1940/41	146,323	575,277	721,600	655,700
1941/42	297,578	889,550	1,187,128	817,800
1942/43	40,049	223,691	263,740	599,400
1943/44	263,423	777,218	1,040,641	776,500
1944/45	200,417	459,396	659,813	774,600
1945/46	26,493	161,075	187,568	667,800
1946/47	170,280	924,329	1,094,609	619,300
Average for 35 seasons	169,619	449,584	619,203	

Clove Production

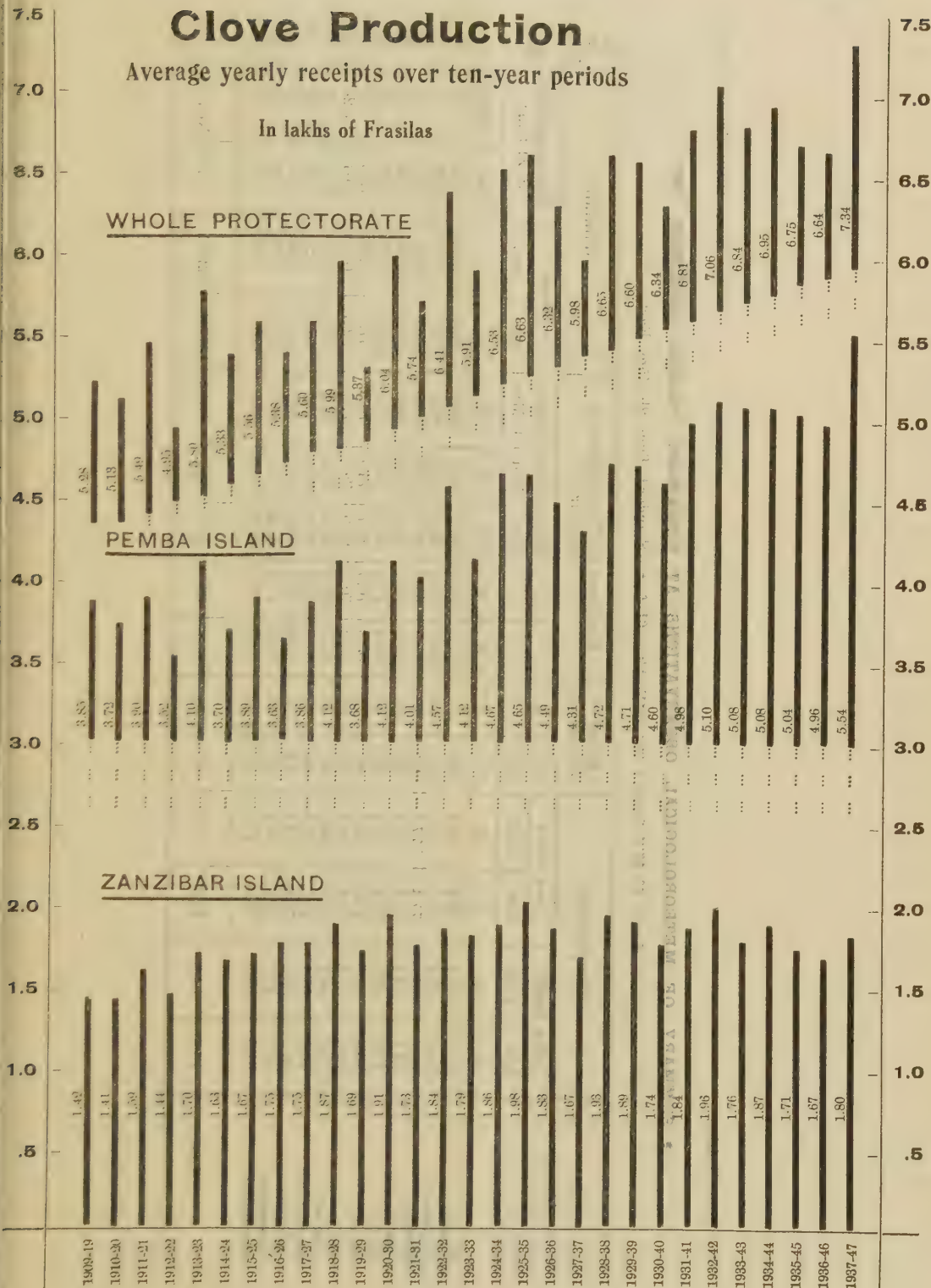
Average yearly receipts over ten-year periods

In lakhs of Frasilas

WHOLE PROTECTORATE

PEMBA ISLAND

ZANZIBAR ISLAND



1st Order Station.

Non—Clove Growing Area.

SUMMARY OF METEOROLOGICAL OBSERVATIONS AT CHUKWANI PALACE, ZANZIBAR, 1947.

Lat.: 6° 15'S Long.: 89° 13'E Alt.: 61 feet. Standard Time 2h 45m East.

Month	Temperature				Relative Humidity		Extremes of Temperature of the Air				Rainfall			No. of Days ^a Rain			
	Dry Bulb		Dew Point		h	h	Max.	Min.	Mean Max.	Mean Min.	$\frac{1}{2}$ Max. + Min.	Total			Maximum Fall in 24 hours		
	8.30	14.30	8.30	14.30								mm.	ins.				
January	82.2	90.7	F	F	82	62	F	F	93.1	76.8	F	F	53.1	2.09	ins.	29	8
February	81.6	89.8	76.3	76.1	82	68	98.5	75.0	91.8	76.5	84.1	76.8	22.9	0.90	0.55	7	3
March	81.2	87.3	77.4	77.1	88	72	96.6	73.0	90.7	76.9	83.8	76.9	163.8	6.45	0.77	3	18
April	78.5	83.4	76.3	77.8	93	83	93.4	72.0	85.3	75.9	80.6	75.9	491.5	19.35	2.50	22	22
May	77.0	80.9	73.8	74.1	89	80	86.4	71.8	82.4	74.6	78.5	74.6	285.2	11.23	2.40	16	19
June	76.4	81.6	72.4	71.5	87	71	85.8	70.6	82.7	74.4	78.5	74.4	47.0	1.85	1.06	6	6
July	74.9	81.8	70.8	69.7	87	67	85.9	70.6	83.0	72.3	77.7	72.3	2.5	0.10	0.04	5, 24	4
August	75.2	80.1	71.1	69.6	87	70	87.7	68.9	82.3	72.1	77.2	72.1	37.3	1.47	0.3	3	12
September	76.7	83.1	71.5	70.8	84	67	91.7	69.0	85.8	71.5	78.7	71.5	57.7	2.27	0.76	29	13
October	78.4	83.4	72.9	72.7	84	70	90.0	69.3	85.8	71.5	78.7	71.5	111.8	4.40	3.23	22	12
November	80.7	85.3	75.2	76.4	83	75	93.6	72.0	87.6	73.8	80.7	73.8	234.4	9.23	3.30	23	16
December	81.6	84.8	76.5	77.6	84	79	92.9	72.7	87.8	75.3	81.5	75.3	110.0	4.33	1.15	15	16
Year	78.7	84.3	74.1	74.3	86	72	98.6	68.9	86.5	74.3	80.4	74.3	1617.2	63.67	3.30	Nov. 23	149

RAINFALL STATIONS, 1947.

Month	CLOVE GROWING AREAS												NON-CLOVE GROWING AREAS											
	Dole		Selem		Mkokotoni		Mkwajuni		Kigomacha		Mtanga-twani		Mkoani		Mtambile		Limbani		Wesha		Chwaka		Makunduchi	
	Rain	Wet Days	Rain	Wet Days	Rain	Wet Days	Rain	Wet Days	Rain	Wet Days	Rain	Wet Days	Rain	Wet Days	Rain	Wet Days	Rain	Wet Days	Rain	Wet Days	Rain	Wet Days	Rain	Wet Days
January	2.15	2	2.30	6	1.27	2	5.58	6	0.42	2	3.00	7	1.06	2	1.96	6	1.13	3	1.11	3	2.14	7	2.59	3
February	0.59	2	0.54	5	0.40	1	1.53	6	0.09	2	0.25	4	0.14	1	0.39	4	0.02	1	0.35	2	0.23	4	0.22	1
March	9.52	12	12.24	20	8.49	10	9.42	15	0.90	3	7.24	15	7.40	12	10.73	11	10.22	17	5.14	13	7.19	13	6.79	8
April	18.01	24	17.11	28	13.90	17	16.75	26	19.94	23	23.33	25	38.39	28	35.51	28	23.08	27	28.24	27	27.44	24	37.60	27
May	12.95	18	9.32	18	15.25	16	11.75	21	29.88	26	28.10	30	40.98	27	42.74	27	60.03	26	41.31	26	14.45	25	20.32	27
June	1.49	9	1.16	9	1.26	4	2.67	12	4.62	18	4.69	23	2.55	10	1.99	12	2.44	14	1.98	17	0.84	13	1.20	13
July	0.25	4	0.54	6	3.77	6	1.48	9	0.32	5	0.74	10	0.63	7	1.17	6	0.95	8	0.87	11	0.87	10	0.44	3
August	2.61	15	3.95	18	4.34	12	4.06	12	6.72	20	7.53	24	5.20	17	5.23	23	6.19	16	5.08	23	3.63	19	2.55	8
September	4.19	18	3.53	15	5.70	10	2.76	12	3.76	16	1.14	14	1.37	7	1.64	12	1.41	11	2.73	16	2.40	11	2.08	6
October	5.10	15	1.98	14	1.82	5	0.13	6	1.92	12	1.31	9	1.22	5	0.55	4	0.13	2	0.64	6	0.13	2	0.80	3
November	8.86	12	7.14	17	2.18	6	2.06	14	2.73	12	6.82	18	6.28	19	6.66	14	4.73	13	3.45	15	1.28	5	2.05	4
December	3.29	10	5.50	13	2.35	7	3.00	9	2.64	12	3.58	13	7.18	15	10.99	20	7.62	12	8.95	15	2.63	5	3.77	10
Total 1947	69.01	141	65.31	169	60.73	96	61.19	148	73.94	151	87.73	192	112.40	150	119.56	167	117.95	150	99.85	174	63.23	138	80.41	113
Total 1946	58.06	101	61.80	142	40.79	60	44.69	121	59.16	111	68.01	155	71.76	125	73.86	140	78.17	128	67.33	125	43.01	109	53.38	60

Note : Rainfall in inches.

